3 1761 07825083 4

Digitized by the Internet Archive
in 2010 with funding from
University of Toronto

http://www.archive.org/details/cyclopaediaoruni19rees

THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

[illegible]

9528 300

No trim

THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XIX.

Printed by A. Strahan.
New-Street-Square, London.

THE

CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS,

BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

VOL. XIX.

LONDON:
PRINTED FOR LONGMAN, HURST, REES, ORME, & BROWN, PATERNOSTER-ROW,
F.C. AND J. RIVINGTON, A. STRAHAN, PAYNE AND FOSS, SCATCHERD AND LETTERMAN, J. CUTHELL,
CLARKE AND SONS, LACKINGTON HUGHES HARDING MAVOR AND JONES, J. AND A. ARCH,
CADELL AND DAVIES, S. BAGSTER, J. MAWMAN, JAMES BLACK AND SON, BLACK KINGSBURY
PARBURY AND ALLEN, R. SCHOLEY, J. BOOTH, J. BOOKER, SUTTABY EVANCE AND FOX, BALDWIN
CRADOCK AND JOY, SHERWOOD NEELY AND JONES, R. SAUNDERS, HURST ROBINSON AND CO.,
J. DICKINSON, J. PATERSON, E. WHITESIDE, WILSON AND SONS, AND BRODIE AND DOWDING.
1819.

LIBRARY
OCT 21 1965
UNIVERSITY OF TORONTO

AE
5
R329
V.19

1016060

CYCLOPÆDIA:

OR, A NEW
UNIVERSAL DICTIONARY
OF
ARTS and SCIENCES.

INCREMENTS.

INCREMENTS, Method of, called by the French *Calcul des Différences Finies*, is a branch of analyſis invented by the learned Dr. Brook Taylor, particularly uſeful in the ſummation of ſeries, and applicable to ſeveral ſubjects of mathematical inveſtigation, where ſcarcely any other method can be ſucceſsfully employed. Montucla obſerves, that had the human mind always purſued the path which appears the moſt natural, the theory of increments, or of finite-differences, would have preceded that of fluxions, or the differential calculus; as it ſeems more natural for the mind to be carried from the conſideration of finite differences, to that of differences indefinitely ſmall, than that the latter ſhould be the precurſor of the former. Such, however, was the fact; for the firſt diſtinct notions of the method of increments did not appear till the year 1715, in a work entitled "Methodus Incrementorum," &c. by Dr. Brook Taylor, in which both the direct and inverſe method of increments are treated of in a very learned manner, and an application of the ſame to various intereſting problems; but the novelty of the ſubject, and the conciſe mode of expreſſion employed by its author, together with the very complicated notation, rendered the work nearly unintelligible to any man leſs ſkilled in analyſis than the author himſelf; even the enunciation of ſome of the propoſitions requires the greateſt poſſible attention in order to comprehend their meaning; but in other reſpects, the work bears ſtrong and evident marks of the lofty genius of its author, and contains, in the ſecond part, many very excellent applications of the preceding theory to the ſolution of ſome of the moſt intereſting and celebrated mathematical problems. Such, however, being the intricacy of the original work, it neceſſarily follows that it could only be read by the very firſt rate mathematicians; and it was therefore fortunate that any of them would condeſcend to illuſtrate a ſubject in which they could only act a ſecondary part; ſuch a perſon was however found in M. Nichole, of the Royal Academy of Sciences, who, having very early been in poſſeſſion of a copy of Dr. Taylor's work, and perceiving, at once, its general utility, he undertook the taſk of illuſtrating the principles upon which it reſted; and, by ſimplifying the notation and operations, rendered it intelligible to readers of an inferior order: his firſt paper on the ſubject was publiſhed in the Memoirs of the Academy for 1717, which was afterwards followed by two others in 1723 and 1724. Dr. Taylor himſelf alſo, in the Philoſophical Tranſactions, undertook an explanation of certain parts of his work, and its farther application to ſome kinds of ſeries beyond thoſe treated of in the original: the ſame was alſo done by M. Montmort, in the Tranſactions for the years 1719 and 1720; which latter gentleman, it ſeems, had conceived ſome idea of the theory before Dr. Taylor's work appeared; and a trifling altercation took place between them as to the originality of ſome of the notions which was claimed by both parties. In 1763, Emerſon publiſhed his "Method of Increments;" a work which, at leaſt, does this author as much credit as any that he ever produced; but the notation reſembles, in a great meaſure, that of Dr. Taylor, which renders it now almoſt obſolete. Emerſon appears to have been extremely anxious to bring the theory of increments to perfection; and earneſtly urged thoſe who were qualified for the taſk, to purſue the paths he had opened to them. "I cannot," ſays he, "promiſe that I ſhall have time and leiſure hereafter to proſecute this ſubject any farther. And as I have an earneſt deſire of advancing truth and improving ſcience, let me here

Strahan and Preſton,
New-Street-Square, London.

entreat the friendly mathematicians, who are lovers of ſcience, to lend their kind aſſiſtance for the advancement of this uncultivated branch of knowledge, yet in its infancy, or rather, as yet, in the hands of Lucina, either according to the model I have here laid before them, or ſome better if it can be found, ſo that, by degrees, it may at length be brought to perfection." Hence it appears that this author was, in 1763, ſenſible of the neglect that had been paid to the theory of increments; and even now, near half a century after this date, the ſubject has not been advanced, nay ſcarcely touched upon by any Engliſh mathematician, while foreign authors are filling quarto volumes with the theory of *differences finies*, and its almoſt univerſal application to the moſt curious and important of mathematical inquiries. Euler, whoſe univerſal genius led him to the inveſtigation of every ſubject that was uſeful and intereſting, did not leave the theory of increments untouched, but has treated of it, in his uſual maſterly ſtyle, in a work entitled "Inſtitutiones Calculi Differentiales," &c. in which he has given a new form, and much extended the bounds of this important branch of analyſis: and ſubſequent authors have adopted his ideas, and rendered permanent the form he gave it. Various other works have ſince appeared to illuſtrate and render familiar the principles of this doctrine; the moſt complete of which is the "Traité des Differences," &c. par Lacroix. Boſſut has likewiſe a chapter on this ſubject in his "Traités des Calcul Differentiel," where the theory is treated in a very elementary and comprehenſive manner; and the ſame is alſo done by Couſin, in chapter 3. of the introduction to his "Traités de Calcul Differentiel," &c.

Having thus given a brief ſketch of the hiſtory and progreſs of the method of increments, we ſhall now endeavour to explain the principles and application of it: in order to which, that we may prepare the reader for the more general theory, it will be uſeful to conſider the ſame in a more limited form in the firſt inſtance, in doing which we cannot have a better model than that of M. Nichole above-mentioned.

The method of this author is extremely ſimple, but certainly leſs general than that of Dr. Taylor; it is, however, well calculated for conveying the firſt clear and connected ideas of this theory, and prepares the reader for more general reſearches, by leading him on, from ſtep to ſtep, with order and preciſion.

If we conſider x as any variable quantity, which is continually increaſed by a conſtant quantity n, ſo that it becomes ſucceſſively x, $x + n$, $x + 2n$, &c.: and if y be any function of x, made up of factors, as $y = x\,(x + n)\,(x + 2n)\,(x + 3n)$, then the difference between this value of y, and that which it becomes when x is again increaſed by n, is the increment of y, or of $x\,(x + n)\,(x + 2n)\,(x + 3n)$; which increment is readily obtained, by obſerving, that

$$(x + n) \quad - \quad x \;\ldots\ldots\ldots\ldots\; = n$$
$$(x + n)\,(x + 2n) \quad - \quad x\,(x + n) \quad = 2n\,(x + n)$$
$$(x + n)\,(x + 2n)\,(x + 3n) - x\,(x + n)\,(x + 2n) = 3n\,(x + n)\,(x + 2n);$$

and hence generally, the increment of $x\,(x + n)\,(x + 2n) \ldots (x + rn) = (r + 1)\,n\,(x + n)\,(x + 2n) \,.\,.\, (x + rn)$: And hence again converſely, the integral of $(r + 1)\,n\,(x + n) \ldots (x + 2n)\,(x + rn) = n\,(x + n)\,(x + 2n) \ldots (x + rn)$; or more generally, the integral of $x\,(x + n)\,(x + 2n) \ldots (x + rn)$

$$= \frac{(x - n)\,x\,(x + n)\,(x + 2n) \,.\,.\, (x + rn)}{(r + 2)\,n}:$$

Again, the increment of x^m is the difference between x^m and $(x + n)^m$. Now $(x + n)^m - x^m = m\,x^{m-1}\,n + \frac{m\,(m - 1)}{1\,.\,2}\,x^{m-2}\,n^2 + \frac{m\,(m - 1)\,(m - 2)}{1\,.\,2\,.\,3}\,x^{m-3}\,n^3 + \&c.$; and by means of this general expreſſion, for the increment of x^m, we readily deduce the increment of any function of x, as $x_m + a\,x^n + b\,x_r +$ &c. Thus, for example, if it were required to find the increment of $x^3 + 3x^2 + 4x$, we have increment of $x^3 = 3x^2\,n + 3x\,n^2 + n^3$

$$\text{———— of } 3x^2 = \qquad 6x\,n + 3n^2$$
$$\text{———— of } 4x = \qquad 4n$$

Hence the increment of $x^3 + 3x^2 + 4x = 3x^2\,n + x\,(3n^2 + 6n) + n^3 + 3n^2 + 4n$.

It is therefore not neceſſary, when we proceed thus, that the propoſed function ſhould be made up of factors in arithmetical progreſſion, as in the former rule.

Again, the increment $\frac{1}{x}$ is the difference between $\frac{1}{x}$ and $\frac{1}{x + n} = -\frac{n}{x\,(x + n)}$; and in the ſame way we find the increment of $\frac{1}{x\,(x + n)} = -\frac{2n}{x\,(x + n)\,(x + 2n)}$; of $\frac{1}{x\,(x + n)\,(x + 2n)} = \frac{-3n}{x\,(x + n)\,(x + 2n)\,(x + 3n)}$; and generally the increment of

$$\frac{1}{x\,(x + n)\,(x + 2n) \ldots\ldots (x + rn)} = -\frac{(r + 1)\,n}{x\,(x + n)\,(x + 2n) \ldots (x + \overline{r + 1}\,n)}.$$

And hence, again, converſely, the integral of

$$\frac{-(r + 1)\,n}{x\,(x + n)\,(x + 2n) \ldots\ldots (x + \overline{r + 1}\,n)} = + \frac{1}{x\,(x + n)\,(x + 2n) \ldots (x + rn)}.$$

Or, more generally, the integral of $\frac{1}{x\,(x + n)\,(x + 2n) \ldots (x + rn)}$

$$= -\frac{\frac{1}{rn}}{x\,(x + n)\,(x + 2n) \ldots\ldots (x + \overline{r - 1}\,n)}.$$

This, as was before obſerved, is not the moſt general mode of conſidering the ſubject, but we are much miſtaken if it be not the moſt obvious and natural; and therefore the beſt adapted for illuſtration, and for conveying to a beginner the firſt ideas of the theory. We will now ſhew the application of the above principles to an example or two, by way of elucidation, and then proceed to a more general and extended inveſtigation of the method of increments, and its application to mathematical problems.

Ex. 1.—Let it be propoſed to find the ſum of 100 terms of the ſeries

$$1\,.\,2 + 2\,.\,3 + 3\,.\,4 + 4\,.\,5 \ldots\ldots 100\,.\,101.$$

Each of theſe terms is of the form $x\,(x + 1)$, and it is obvious that the next term to 100 . 101, that is 101 . 102, is the increment of the ſeries; or, making $100 = x$, the laſt term is $x\,(x + 1)$, and the ſucceeding one is $(x + 1)\,(x + 2)$; which is evidently the increment of the ſeries, or the difference between the propoſed ſeries in the firſt caſe, and what it becomes when x is increaſed by the common difference 1; and therefore converſely, the integral of this increment, that is, of $(x + 1)\,(x + 2)$, will be the ſum of the ſeries ſought. Now the integral of $(x + 1)\ (x + 2) = \frac{x\ (x + 1)\ (x + 2)}{3}$; and ſince x in the preſent example $= 100$, we have $\frac{100 \times 101 \times 102}{3} = 343400$ for the ſum required.

Ex. 2.—Required the ſum of n terms of the ſeries $1 . 2 . 3 + 2 . 3 . 4 + 3 . 4 . 5 +$ &c. $n\,(n + 1)\ (n + 2)$.

Here, by writing x inſtead of $n + 1$, we ſhall have for the ſucceeding term $x\ (x + 1)\ (x + 2)$, which is the increment of the ſeries, and therefore the integral of $x\ (x + 1)\ (x + 2) = \frac{(x - 1)\ x\ (x + 1)\ (x + 2)}{4}$ will be the ſum required; which, by re-eſtabliſhing the value of $x = n + 1$, becomes $\frac{n\ (n + 1)\ (n + 2)\ (n + 3)}{4} =$ the ſum of n terms.

Ex. 3.—Required the ſum of n terms of the natural ſeries of ſquares $1^2 + 2^2 + 3^2 + 4^2 + \ldots\ldots n$.

Here writing x for n, the ſucceeding term is $(x + 1)^2 = x^2 + 2x + 1 = x\ (x + 1) + (x + 1)$, which is the increment; and it conſiſts of two parts. Now the

integral of $x\ (x + 1) = \frac{(x + 1)\ x\ (x + 1)}{3}$;

integral of $x + 1 = \frac{x\ (x + 1)}{2}$.

And therefore ſince $x = n$, we have $\frac{n\ (n + 1)}{2} + \frac{(n - 1)\ n\ (n + 1)}{3} =$ the ſum required..

Ex.—Let it now be propoſed to find the ſum of the infinite ſeries $\frac{1}{1 . 2} + \frac{1}{2 . 3} + \frac{1}{3 . 4} + \frac{1}{4 . 5} +$ &c.

Here it will be neceſſary for us to conſider the ſeries as generated from the extreme term; which is 0, and therefore $\frac{1}{1 . 2}$ as its laſt term, which will therefore be the increment of the ſeries $\frac{1}{2 . 3} + \frac{1}{3 . 4} + \frac{1}{4 . 5} +$ &c.; and, conſequently, the integral of this will be the ſum of the ſeries, wanting only the term $\frac{1}{1 . 2}$. Make, therefore, $x = 2$, or $\frac{1}{2 . 3} = \frac{1}{x\ (x + 1)}$; in which caſe the increment $\frac{1}{1 . 2}$ becomes $\frac{1}{(x - 1)\ x}$, and the integral of this $= \frac{1}{x}$ (becauſe the increment is $- 1$); therefore the ſum of the ſeries, beginning at the term $\frac{1}{2 . 3}$, is $\frac{1}{2}$, to which adding the firſt term $\frac{1}{1 . 2} = \frac{1}{2}$, we have the ſum of the whole ſeries $= 1$.

This will ſerve to explain the method purſued by M. Nichole in his firſt paper, and will be uſeful as an introduction to what follows: in which we ſhall not limit ourſelves to conſidering the continual increaſe of x as conſtant as is done above; but as being variable like x itſelf; for it is under this form, that the theory of increments becomes ſo univerſally applicable to almoſt every ſpecies of mathematical inveſtigation.

Notation and Definitions.

1. As the increment of a variable quantity x is nothing more than the difference between that quantity in its firſt ſtate, and what it becomes after a certain increaſe, this difference may be properly repreſented by $D\,x$, or $\Delta\,x$; and in the ſame manner, if y be any function of a variable quantity, $D\,y$, or $\Delta\,y$, will repreſent the increment of y. And as in the fluxional or differential calculus, $\int$ is made the character of integration, ſo in the preſent inſtance, we ſhall employ it to repreſent the integral of any increment.

2. The increment of a variable quantity being, as we have obſerved above, only the exceſs of this quantity in one ſtate, over the ſame quantity in the conſecutive ſtate, it follows that if a variable magnitude x become ſucceſſively x, x', x'', x''', &c. we ſhall have $\Delta\,x = x' - x$; $\Delta\,x' = x'' - x'$; $\Delta\,x'' = x''' - x''$; $\Delta\,x''' = x^{IV} - x'''$, &c.

It may happen that an increment may be poſitive, or negative, according as the variable quantity of which it is the increment is augmented or diminiſhed, with regard to ſome other magnitude or magnitudes which we ſuppoſe to increaſe, and of which the increments are therefore neceſſarily poſitive.

3. The increments of quantities being themſelves quantities, if they be variable, we may take the increments of them, theſe are called *ſecond increments;* and if theſe ſecond increments be alſo variable, we may in like manner take the increments of theſe alſo; which are called *third increments,* and ſo on as long as the differences or increments are variable.

In all theſe caſes, the condition of the increments being variable, is neceſſary; becauſe if, in any caſe, they become conſtant, then it is obvious that the increments are 0, whether it be the firſt, ſecond, third, &c. increment that thus become conſtant or invariable.

Thus the ſeries of ſquares 1, 4, 9, 16, 25, &c. is an example of a caſe in which the ſecond differences or increments are conſtant: for this ſeries may be conſidered as generated by a variable quantity x^2; which is ſuch, that if the difference between the ſucceſſive terms be taken, they will form a ſeries of quantities in arithmetical progreſſion, and conſequently the differences of theſe differences, or the ſecond increment of x^2 will be conſtant. In the ſame manner we find the third differences of the ſeries of cubes, 1, 8, 27, 64, 125, or the third increment of x^3, is conſtant; and therefore the fourth increment $= 0$; for after any order of increments becomes conſtant, all the ulterior orders muſt, neceſſarily, become zero.

4. As $\Delta\,x$ denotes the firſt increment of any variable quantity x; ſo $\Delta^2 x$, $\Delta^3 x$, $\Delta^4 x$, &c. will repreſent the ſecond, third, fourth, &c. increments of the ſame quantity x; which expreſſions are ſufficiently diſtinct from $\Delta\,x^2$, $\Delta\,x^3$, $\Delta\,x^4$, &c. which repreſent the powers of thoſe increments; and if it be required to expreſs the power of any increment paſt the firſt, as for inſtance the nth power of the ſecond, third, &c. increment of x, that will be done thus, $\Delta^2 x^n$, $\Delta^3 x^n$, &c.

5. In ſome problems it is neceſſary to conſider a certain order of the increments as conſtant; thus, in any arithmetical progreſſion the firſt increments are conſtant. In the ſeries of natural ſquares, the ſecond increments are neceſſarily conſtant; as are alſo the third increments of cubes, &c. as we have ſeen above. But there is an in-

finite number of queſtions, in which, from their nature, it is not neceſſary that any order of their increments ſhould be conſtant: yet as we may attribute to a certain quantity whatever variation we pleaſe, providing that the variations of the other quantities depending upon the firſt be ſuch as to accord with the variation we have attributed to it; it follows, that in any problem, we may at pleaſure make any order of increments of a quantity choſen at will be conſtant; obſerving only, that the other quantities ought to vary in conſequence; and, therefore, we cannot make another order of increments alſo conſtant, unleſs, from the nature of the problem, ſome other increment has a certain ratio to that which is ſo aſſumed.

6. The whole of the method of increments conſiſts of two problems; *viz.* 1ſt. Finding the increments of all orders of any variable quantity, raiſed to any power; the product of different variable quantities; and generally of any function of variable quantities; which problem is always ſolvible, and preſents but little difficulty in any caſe; and this is called the *Direct Method of Increments.* The other problem, which is the reverſe of the preceding, is that of finding the integral of any given increment, which is frequently inſolvible; at leaſt, without infinite ſeries, or ſome other mode of approximation; and this is termed the *Inverſe Method of Increments:* which two problems we will conſider under their diſtinct heads.

Of the Direct Method of Increments.

7. Since the increment of a variable quantity is the difference between the ſums in any two conſecutive ſtates, it is obvious in general, that in order to find the increment of any function of variable quantities, we muſt ſuppoſe, that each of thoſe quantities is increaſed or diminiſhed by their reſpective increments; and ſubſtitute theſe quantities, thus changed, into the propoſed function; and from this reſult, if there be ſubtracted the original expreſſion, the remainder will be the increment ſought.

Ex. 1.—Find the firſt increment of the ſum $x + y + z$. Theſe quantities, augmented by their reſpective increments, become

$$(x + \Delta x) + (y + \Delta y) + (z + \Delta z)$$

from which ſubtracting the original expreſſion, there remains $\Delta x + \Delta y + \Delta z$, as is evident; ſince the whole increment muſt neceſſarily be equal to the ſum of each particular one.

In the ſame manner we find the increment of $x + y - z$, or $\Delta(x + y - z) = \Delta x + \Delta y - \Delta z$.

And if we had to find the increment of $a + x + y - z$, we ſhould have, conſidering a as a conſtant quantity,

$$\Delta(a + x + y - z) = \Delta x + \Delta y - \Delta z,$$

the ſame reſult as before, becauſe the conſtant quantity a has no increment, or its increment is equal to zero.

Hence it appears, that if to the ſum of any variable quantity we add or ſubtract any conſtant quantity whatever, the increment of the whole function will ſtill be the ſame.

Ex. 2. Find the firſt increment of x^m.

This is, from what is obſerved above, the difference between $(x + \Delta x)^m$ and x^m; which by the binomial theorem becomes $m\ x^{m-1}\Delta x + \frac{m(m-1)}{1 \cdot 2} x^{m-2}\Delta x^2 + \frac{m(m-1(m-2)}{1 \cdot 2 \cdot 3} x^{m-3}\Delta x^3 + \text{\&c.}\ \Delta x^m$. Thus we find the increment of x^2, or

$$\Delta(x^2) = 2x\Delta x + \Delta x^2$$
$$\Delta(x^3) = 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3$$
$$\Delta(x^4) = 4x^3\Delta x + 6x^2\Delta x^2 + 4x\Delta x^3 + x^4$$
$$\text{\&c. \&c.} \qquad \text{\&c. \&c.}$$

And if the propoſed quantity, of which the increment is required, be ax^m, a being a conſtant multiplier, then it is obvious that

$$\Delta(ax^m) = \begin{cases} a(x + \Delta x)^m - ax^m = \\ a(x + \Delta x)^m - a(x^m) = \\ a[(x + \Delta x)^m - x^m] = a\Delta(x^m) \end{cases}$$

whence the increment ax^m is equal to a times, the increment of x^m.

Ex. 3. To find the firſt increment of the product xy.

Here x becomes $x + \Delta x$
and y becomes $y + \Delta y$

whence the product $= xy + y\Delta x + x\Delta y + \Delta x\Delta y$; from which, ſubtracting the original quantity xy, we have $\Delta(xy) = y\Delta x + x\Delta y + \Delta x\Delta y$.

And in the ſame way we find

$$\Delta(xyz) = \begin{cases} yz\Delta x + xz\Delta y + xy\Delta z + x\Delta y\Delta z \\ + y\Delta x\Delta z + z\Delta x\Delta y + \Delta x\Delta y\Delta z. \end{cases}$$

And in like manner may the increment of any other product be readily aſcertained.

If the product was axy, $axyz$, &c., a being a conſtant quantity, we ſhould have

$$\Delta(axy) = a\Delta(xy),\ \Delta(axyz) = a\Delta(xyz), \text{\&c.}$$

that is, we muſt find the increment as above, and multiply the reſult by the conſtant factor a.

Ex. 4.—To find the firſt increment of any quantity of the form $x(x + a)(x + 2a)(x + 3a)\ldots\ldots\ldots(x + ra)$. It is obvious that this may be referred to the preceding example, by making $x + a = u$; $x + 2a = y$; $x + 3a = z$; &c. under which ſubſtitution, the function, of which the increment is required, reduces to $xuyz$, &c. and, conſequently, $\Delta(xuyz)$ may be found as above. But if, without this ſubſtitution, we find the actual product, it is obvious that it will take the following form (where A, B, C, D, &c. repreſent conſtant quantities); *viz.*

$$x^n + Ax^{n-1} + Bx^{n-2} + Cx^{n-3} + Dx^{n-4} + \text{\&c.}$$

and hence by finding the increments of each of thoſe terms by example 2, the ſum of them will be the increment of the function propoſed. Thus,

$$\Delta\Big(x(x + a)\Big) = \Delta(x^2 + ax).$$

$$\text{Now } \Delta(x)^2 = 2x\Delta x + \Delta x^2,$$
$$\Delta(ax) = a\Delta(x) = a\Delta x;$$

whence $\Delta\Big(x(x + a)\Big) = (2x + a)\Delta x + \Delta x^2$.

And in the ſame manner

$$\Delta\Big(x(x + a)(x + 2a)\Big) = \Delta(x^3 + 3ax^2 + 2a^2x).$$

$$\text{Now } \Delta(x^3) = 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3$$
$$\Delta(3ax^2) = 6ax\Delta x + 3a\Delta x^2$$
$$\Delta(2a^2x) = 2a^2\Delta x.$$

The ſum of which particular increments will be the increment of the original function propoſed: and in exactly the ſame way, the increment of any ſimilar function may be aſcertained.

Ex. 5.—To find the firſt increment of the fraction $\frac{x}{y}$.

Here we have

$$\Delta\left(\frac{x}{y}\right) = \begin{cases} \dfrac{x+\Delta x}{y+\Delta y} - \dfrac{x}{y} = \dfrac{y\,\Delta x - x\,\Delta y}{y + y\,\Delta y} = \\ (y\,\Delta x - x\,\Delta y)\;(y^2 + y\,\Delta y)^{-1} \end{cases}$$

And therefore from the expanſion of $(y^2 + y\,\Delta y)^{-1}$ into a ſeries, we have

$$\Delta\left(\frac{x}{y}\right) = \frac{(y\Delta x - x\Delta y)}{y^2} \times \left(1 - \frac{\Delta y}{y} + \frac{\Delta y^2}{y^2} + \frac{\Delta y^3}{y^3} + \&c.\right)$$

And if the propoſed fraction be effected with any conſtant factor a, the whole of the above increment muſt be multiplied by a.

Ex. 6.—To find the firſt increment of the quantity $\sqrt{(a^2 + x^2)}$.

Here it is obvious, on the ſame principles, that

$$\Delta\left(\sqrt{(a^2+x)^2}\right) = \sqrt{\left(a^2 + (x + \Delta x)^2\right)} - \sqrt{(a^2+x^2)}$$

$$\sqrt{\left((a^2 + x^2) + (2\,x\,\Delta x + \Delta x^2)\right)} - \sqrt{(a^2 + x^2)}$$

And if now we conſider theſe two expreſſions as two binomials, to be raiſed to the power $\frac{1}{2}$, it is obvious that from the developement of the firſt, there will be cancelled the firſt term, and the other terms will repreſent the increment required; and thus we have

$$\Delta\sqrt{(a^2 + x^2)} = \frac{2\,x\,\Delta x + \Delta x^2}{2\,(a^2+x^2)^{\frac{1}{2}}} - \frac{(2\,x\,\Delta x + \Delta x^2)^2}{8\,(a^2+x^2)^{\frac{2}{3}}}$$

$$+ \frac{(2\,x\,\Delta x + \Delta x^2)^3}{16\,(a^2+x^2)^{\frac{5}{2}}} - \&c.$$

Ex. 7.—Having given the equation $y^2 - a\,x + x^2 = 0$ which expreſſes the relation between the conſtant quantity a, and the two variable quantities x and y; to find the equation which ought to expreſs the relation between a, and the firſt increments of x and y.

Here we muſt ſubſtitute $x + \Delta x$ for x; and $y + \Delta y$ for y; which gives

$$(y + \Delta y)^2 - a\,(x + \Delta x) + (x + \Delta x)^2 = 0;$$

from which, ſubtracting the original equation, there remains

$$2\,y\,\Delta y - a\,\Delta x + 2\,x\,\Delta x + \Delta x^2 + \Delta y^2 = 0,$$

which is the equation required.

And in a ſimilar manner the firſt increments of any quantities whatever may be aſcertained, as alſo of any algebraical equation.

When it is required to find the ſecond, third, &c. increments of any propoſed function, it is only neceſſary to conſider the preceding order of increments as variable quantities; and we ſhall thus paſs from the firſt increments to the ſecond, from the ſecond to the third, from the third to the fourth, &c.; in the ſame manner as we paſs from the original function to the firſt increment.

Ex. 1.—To find the ſecond increment of x^2.

Here we have, in the firſt place,

$$\Delta\,(x^2) = 2\,x\,\Delta x + \Delta x^2 \text{ the firſt increment.}$$

And if now, in this expreſſion, we ſubſtitute $x + \Delta x$ for x, and $\Delta x + \Delta^2 x$ for Δx, we have

$$\Delta^2\,(x^2) = \Delta\,(2\,x\,\Delta x + \Delta x^2) = 2\,(x + \Delta x)$$
$$(\Delta x + \Delta^2 x) + (\Delta x + \Delta^2 x)^2 - (2\,x\,\Delta x + \Delta x^2)$$
$$= 2\,\Delta x^2 + 4\,\Delta x\,\Delta^2 x + 2\,x\,\Delta^2 x + \Delta^2 x^2,$$

which is the ſecond increment required.

And in the ſame way we find the third, fourth, &c. increments of a quantity or function, by ſubſtituting $\Delta^2 x + \Delta^3 x$ inſtead of $\Delta^2 x$; and $\Delta^3 x + \Delta^4 x$ inſtead of $\Delta^3 x$; and ſo on.

Remark.—If we conſider the ſecond increments as being conſtant, it adds very much to the ſimplicity of the operation; for, after having found the firſt increments, *viz.*

$$\Delta\,(x^2) = 2\,x\,\Delta x + \Delta x^2,$$
$$\Delta\,(x^3) = 3\,x^2\,\Delta x + 3\,x\,\Delta x^2 + \Delta x^3,$$
$$\Delta\,(x^4) = 4\,x^3\,\Delta x + 6\,x^2\,\Delta x^2 + 4\,x\,\Delta x^3 + \Delta x^4,$$
$$\&c.\ \&c. \qquad \&c.\ \&c.$$

we ſhall have for the higher order of increments,

$$\Delta^2\,(x^2) = 2\,\Delta x^2,\ \Delta^3\,x^2 = 0,\ \Delta^4\,(x^3) = 0,\ \&c.$$
$$\Delta^2\,(x^3) = 6\,x\,\Delta x^2 + 6\,\Delta x^3,\ \Delta^2\,(x^3) = 6\,\Delta x^3,$$
$$\Delta^4\,(x^3) = 0,\ \Delta^5\,(x^3) = 0,\ \&c.$$
$$\Delta^2\,(x^4) = 12\,x^2\,\Delta x^2 + 24\,x\,\Delta x^3 + 14\,\Delta x^4,$$
$$\Delta^3\,(x^4) = 24\,x\,\Delta x^3 + 36\,\Delta x^4,\ \Delta^4\,(x^4) = 24\,\Delta x^4,$$
$$\Delta^5\,(x^4) = 0,\ \Delta^6\,(x^4) = 0,\ \&c.$$
$$\&c.\ \&c.\ \&c.$$

Scholium.—It is eaſy to find, on the ſame principles, the ſecond increments of all ſorts of functions. For example, to find the ſecond increment of the product $x\,y$, without ſuppoſing any increment as conſtant, we muſt firſt find the firſt increment, which is,

$$\Delta\,(x\,y) = y\,\Delta x + x\,\Delta y + \Delta x\,\Delta y.$$

And ſubſtituting now in this expreſſion,

$x + \Delta x$ for x, and $y + \Delta y$ for y;
$\Delta x + \Delta^2 x$ for Δx, and $\Delta y + \Delta^2 y$ for Δy,

it becomes

$$(y + \Delta y)\;(\Delta x + \Delta^2 x) + (x + \Delta x)$$
$$(\Delta y + \Delta^2 y) + (\Delta x + \Delta^2 x)\;(\Delta y + \Delta^2 y);$$

from which, ſubtracting the firſt increment, there remains

$$\Delta^2\,(x\,y) = y\,\Delta^2 x + x\,\Delta^2 y + 2\,\Delta x\,\Delta y$$
$$+ 2\,\Delta y\,\Delta^2 x + 2\,\Delta x\,\Delta^2 y + \Delta^2 x\,\Delta^2 y.$$

And if we ſuppoſe Δx conſtant, this expreſſion reduces to

$$\Delta^2\,(x\,y) = x\,\Delta^2 y + 2\,\Delta x\,\Delta y + 2\,\Delta x\,\Delta^2 y.$$

And ſimilar methods apply in all caſes; it will, therefore, be unneceſſary to give any farther examples, except in the caſe of an exponential expreſſion, which is ſomewhat different.

Let it be propoſed, for example, to find the increment of the hyperbolic logarithm of x.

Let $y = h\,.\,l\,.\,x$; then, as x becomes $x + \Delta x$; ſo will y become $y + \Delta y$, that is,

$$y + \Delta y = h\,l\,(x + \Delta x);$$

and hence, ſince $y = h\,.\,l\,.\,x$, we have

$$y + \Delta y - y = h\,.\,l\,(x + \Delta x) - h\,.\,l\,.\,x, \text{ or}$$

$$\Delta y = h\,l\,(x + \Delta x) - h\,l\,.\,x = h\,l\left(1 + \frac{\Delta x}{x}\right).$$

Now, by the well-known logarithmic ſeries, we have

$$h\,.\,l\left(1 + \frac{\Delta x}{x}\right) = \frac{\Delta x}{x} - \frac{\Delta x^2}{2\,x^2} + \frac{\Delta x^3}{3\,x^3} - \frac{\Delta x^4}{4\,x^4} + \&c.$$

$$\text{whence } \Delta y = \Delta\,(h\,l\,x) = \frac{\Delta x}{x} - \frac{\Delta x^2}{2\,x^2} + \frac{\Delta x^3}{3\,x^3} - \frac{\Delta x^4}{4\,x^4}$$

+ &c. as required. And the higher order of increments of $h\,l\,x$ will be found as above, by taking the increments of the terms of this ſeries.

Ex. 2.—Required the firſt increment of the exponential expreſſion a^x.

Make $y = a^x$; then, when x becomes $x + \Delta x$, y will become $y + \Delta y$; whence

$$y + \Delta y = a^{x + \Delta x} = a^x \times a^{\Delta x};\ \text{but}$$
$$y \qquad = a^x \qquad = a^x:$$

$$\text{whence } \Delta y = a^x \times a^{\Delta x} - a^x = a^x\,(a^{\Delta x} - 1).$$

Now, expanding $(a^{\Delta x} - 1)$ into a ſeries, we have

$$(a^{\Delta x} - 1) = 1 + \frac{\Delta x\,(l.a)}{1} + \frac{\Delta x^2\,(l.a)^2}{1.2} + \frac{\Delta x^3\,(l.a)^3}{1.2.3} + \&c.$$

Therefore Δy, or $\Delta\,(a^x) =$

$$a^x \times \left\{\frac{\Delta\,(la)}{1} + \frac{\Delta x^2\,(l.a)^2}{1.2} + \frac{\Delta x^3\,(l.a)^3}{1.2.3} + \&c.\right\}$$

as required. And the higher order of its increments may be found by the uſual method.

Of the Inverſe Method of Increments.

8. In the inverſe method of increments, the queſtion is to find the integral, or function, from its increment being given. We muſt, therefore, examine with attention the ſteps by which we deſcend from a variable quantity to its increment; and then, by the reverſe operation, we may aſcend to the integral, when the increment is known. But this reverſe operation is attended with the very ſame difficulties as the inverſe method of fluxions, for, as in that, every fluent may be readily put into fluxions, ſo may the increment of any function be readily obtained; but it is frequently difficult, and ſometimes impoſſible to find the fluent of a given fluxion; and ſo in the method of increments, there are many caſes that will not admit of integration; we ſhall, however, give ſome of the moſt uſual and obvious rules, and which will apply to the generality of examples.

Let us firſt attend to the powers of a variable quantity x.

1. Since $\Delta x = \Delta\,(x)$; therefore, reciprocally, $\int \Delta x = x$. And if we ſuppoſe Δx as conſtant (a ſuppoſition that has place in all that follows), we ſhall have $\int \Delta x \times 1 = x$, or $\Delta x \int 1 = x$; therefore $\int 1 = \frac{x}{\Delta x}$.

2. Since $\Delta\,(x^2) = 2x\Delta x + \Delta x^2$, therefore, reciprocally, $\int (2x\Delta x + \Delta x^2) = x^2$; or, which is the ſame, $\int 2x\Delta x + \int \Delta x^2 = x^2$; whence again alſo $\int x + \int \frac{\Delta x}{2} = \frac{x^2}{2\Delta x}$; and hence, by tranſpoſition, $\int x = \frac{x^2}{2\Delta x} - \int \frac{\Delta x}{2} = \frac{x^2}{2\Delta x} - \frac{\Delta x}{2} \times \int 1 = \frac{x^2}{2\Delta x} - \frac{x}{2}$.

3. Again, ſince $\Delta\,(x^3) = 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3$; therefore, reciprocally,

$\int (3x^2\Delta x + 3x\Delta x^2 + \Delta x^3) = x^3$; or, which is the ſame,

$\int 3x^2\Delta x + \int 3x\Delta x^2 + \int \Delta x^3 = x^3$; or dividing by $3\Delta x$

$\int x^2 + \Delta x \int x + \frac{\Delta x^2}{3} . \int 1 = \frac{x^3}{3\Delta x}$; whence, again,

$\int x^2 = \frac{x^3}{3\Delta x} - \Delta x \int x - \frac{\Delta x^2}{3} . \int 1$; or, which is the ſame,

$$\int x^2 = \frac{x^3}{3\Delta x} - \frac{x^2}{2} + \frac{x\Delta x}{6}.$$

We find in a ſimilar manner, by continuing to ſuppoſe Δx as conſtant, and ſubſtituting always for the quantities contained under the particular ſum their reſpective values; the following reſults for the integrals of the ſucceſſive powers of x; in which we have repeated the two preceding ones, for the ſake of uniformity.

$$\int 1 = \frac{x}{\Delta x};$$

$$\int \Delta x = \frac{x^2}{2\Delta x} - \frac{x}{2};$$

$$\int \Delta x^2 = \frac{x^3}{3\Delta x} - \frac{x^2}{2} + \frac{x\Delta x}{6};$$

$$\int \Delta x^3 = \frac{x^4}{4\Delta x} - \frac{x^3}{2} + \frac{x^2\Delta x}{4};$$

$$\int \Delta x^4 = \frac{x^5}{5\Delta x} - \frac{x^4}{2} + \frac{x^3\Delta x}{3} - \frac{x\Delta x^3}{30};$$

$$\int \Delta x^5 = \frac{x^6}{6\Delta x} - \frac{x^5}{2} + \frac{5x^4\Delta x}{12} - \frac{x^2\Delta x^3}{12};$$

&c. &c. &c. &c.

where it is only neceſſary to obſerve, that if the propoſed increment have any conſtant multiplier, the integral above found muſt have the ſame.

Cor. 1.—Hence we may find the integral of any function compoſed of the powers of x, affected with any conſtant coefficients a, b, c, &c. For in order to find the integral of ſuch an increment, it is only neceſſary to find thoſe of the different powers of x, and their ſum will be the integral required.

Ex. 1.—Required the integral of the increment $a + bx + cx^2$; conſidering Δx as conſtant.

$$\int a = a \int 1 = \frac{ax}{\Delta x}$$

$$\int bx = b \int x = \frac{bx^2}{2\Delta x} - \frac{bx}{2}$$

$$\int cx^2 = c \int x^2 = \frac{cx^3}{3\Delta x} - \frac{cx^2}{2} + \frac{cx\Delta x}{6}$$

And hence by addition,

$$\int (a + bx + cx^2) = \frac{ax}{\Delta x} + \frac{bx^2}{2\Delta x} \quad \frac{bx}{2} + \frac{cx^3}{3\Delta x} - \frac{cx^2}{2} + \frac{cx\Delta x}{6}.$$

Ex. 2.—Required the integral of $ax^4 - bx^2$, conſidering Δx as conſtant.

Here we have

$$\int ax^4 = \frac{ax^5}{5\Delta x} - \frac{ax^4}{2} + \frac{ax^3\Delta x}{3} - \frac{ax\Delta x^3}{30}$$

$$\int -bx^2 = \frac{-bx^3}{3\Delta x} + \frac{bx^2}{2} - \frac{bx\Delta x}{6}$$

the ſum of which expreſſions will be the whole increment ſought.

Cor. 2.—When it is required to find the integral of a quantity of any of the following forms, (Δx being ſuppoſed conſtant,) *viz.*

$(x + a)$
$(x + a)\,(x + 2a)$
$(x + a)\,(x + 2a)\,(x + 3a)$
$(x + a)\,(x + 2a)\,(x + 3a)\,(x + 4a)$

we arrive at them by taking the actual product of thoſe quantities, and finding ſucceſſively the increments of each of the terms: thus,

1. $\int (x + a) = \int x + \int a = \frac{x^2}{2\Delta x} - \frac{x}{2} + \frac{ax}{\Delta x}$

2. $\int (x + a)\,(x + 2a) = \int (x^2 + 3ax + 2a^2) =$

$$\begin{cases} \int x^2 = \dfrac{x^3}{3\,\Delta x} - \dfrac{x^2}{2} + \dfrac{x\,\Delta x}{6} \\ \int 3\,a\,x = \dfrac{3\,a\,x^2}{2\,\Delta x} - \dfrac{3\,a\,x}{2} \\ \int 2\,a^2 = \dfrac{2\,a^2\,x}{\Delta x} \end{cases}$$

Whence $\int (x + a)\,(x + 2\,a) = \dfrac{x^3}{3\,\Delta x} - \dfrac{x^2}{2} + \dfrac{x\,\Delta x}{6} + \dfrac{3\,a\,x^2}{2\,\Delta x} - \dfrac{3\,a\,x}{2} + \dfrac{2\,a^2\,x}{\Delta x}$.

3. Again, $\int (x + a)\,(x + 2\,a)\,(x + 3\,a) = \int (x^3 + 6\,a\,x^2 + 11\,a^2\,x + 6\,a^3) =$

$$\begin{cases} \int x^3 = \dfrac{x^4}{4\,\Delta x} - \dfrac{x^3}{2} + \dfrac{x^2\,\Delta x}{4} \\ \int 6\,a\,x^2 = \dfrac{6\,a\,x^3}{3\,\Delta x} - \dfrac{6\,a\,x^2}{2} + \dfrac{6\,a\,x\,\Delta x}{6} \\ \int 11\,a^2\,x = \dfrac{11\,a^2\,x^2}{2\,\Delta x} - \dfrac{11\,a^2\,x}{2} \\ \int 6\,a^3 = \dfrac{6\,a^3\,x}{\Delta x} \end{cases}$$

Whence by addition, we have $\int (x + a)\,(x + 2\,a)\,(x + 3\,a) = \dfrac{x^4}{4\,\Delta x} - \dfrac{x^3}{2} + \dfrac{x^2\,\Delta x}{4} + \dfrac{2\,a\,x^3}{\Delta x} - \dfrac{3\,a\,x^2}{1} + \dfrac{a\,x\,\Delta x}{1} + \dfrac{11\,a^2\,x^2}{2\,\Delta x} + \dfrac{6\,a^3\,x}{\Delta x} - \dfrac{11\,a^2\,x}{2} + \dfrac{6\,a^3\,x}{\Delta x}$; and ſo on of other ſimilar quantities.

And if it be required to find the integral of quantities of the form

$$\begin{gathered} x\,(x + a) \\ x\,(x + a)\,(x + 2\,a) \\ x\,(x + a)\,(x + 2\,a)\,(x + 3\,a) \\ \text{\&c. \&c. \&c.} \end{gathered}$$

we have in the ſame way

1. $\int x\,(x + a) = \int x^2 + \int a\,x = \dfrac{x^3}{3\,\Delta x} - \dfrac{x^2}{2} + \dfrac{x\,\Delta x}{6} + \dfrac{a\,x^2}{2\,\Delta x} - \dfrac{a\,x}{2}$

2 $\int x\,(x + a)\,(x + 2\,a) = \int x^3 + 3\,a \int x^2 + 2\,a^2 \int x =$

$$\begin{cases} \int x^3 = \dfrac{x^4}{4\,\Delta x} - \dfrac{x^3}{2} + \dfrac{x^2\,\Delta x}{4} \\ 3\,a \int x^2 = \dfrac{3\,a\,x^3}{3\,\Delta x} - \dfrac{3\,a\,x^2}{2} + \dfrac{3\,a\,x\,\Delta x}{6} \\ 2\,a \int x = \dfrac{2\,a\,x^2}{2\,\Delta x} - \dfrac{2\,a\,x}{2} \,; \end{cases}$$

the ſum of which will be the increment required.

And, in a ſimilar manner, we may find the integral to any other quantity of theſe forms.

9. *Remark.*—Before we proceed any further on this ſubject, it will be proper to attend to the correction of any integral, when from the nature of the problem under conſideration ſuch becomes neceſſary.

As the increments of any variable quantities x, and $x + a$ are both expreſſed by Δx, the conſtant part a having no increment, ſo, reciprocally, the integral of the increment Δx may be x, or $x + a$; therefore, when we have found the integral of any increment, we muſt add to it a conſtant quantity, which will be zero, if the integral needs no correction but a real quantity, poſitive or negative, in other caſes, which muſt be determined from the nature of the problem. This remark will be of conſiderable importance in what follows.

10. Let us then conſider thoſe products, of which the factors are continually increaſed by a conſtant difference; *viz.*

$$\begin{gathered} x\,(x + \Delta x) \\ x\,(x + \Delta x)\,(x + 2\,\Delta x) \\ x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x) \\ \text{\&c. \&c. \&c.} \end{gathered}$$

Here it is obvious that the increment of $x\,(x + \Delta x)$; or $1\,\Delta\big(x\,(x + \Delta x)\big) = (x + \Delta x)\,(x + 2\,\Delta x) - x\,(x + \Delta x)$; whence, by multiplication and ſubtraction, we have $\Delta\,\big(x\,(x + \Delta x)\big) = 2\,\Delta x\,(x + \Delta x)$.

In the ſame manner we find,

$\Delta\,\big(x\,(x + \Delta x)\,(x + 2\,\Delta x)\big) = 3\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x)$;

And thus again,

$\Delta\big(x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x)\big) = 4\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x)$

and ſo on of other ſimilar products. Whence it appears, that in order to find the increment of any product of the above form, we muſt ſuppreſs the firſt factor x, and write in its place the increment Δx, effected with a co-efficient equal to the total number of factors ; all the other part of the expreſſion remaining as before.

Whence again, converſely, the integral to any increment of this form, will be found from the reverſe operation.

Thus for example,

1. $\int 2\,\Delta x\,(x + \Delta x) = x\,(x + \Delta x)$

2. $\int 3\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x) = x\,(x + \Delta x)\,(x + 2\,\Delta x)$

3. $\int 4\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x) = x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x)$

and ſo on of others.

Whence, in order to find the correſponding integral to any increment of the above form, which may be repreſented generally by

$$a\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x)\,.\,.\,.\,(x + n\,\Delta x),$$

we muſt change Δx in the firſt factor into x, and divide the whole by the number of factors ; that is,

$$\int a\,\Delta x\,(x + \Delta x)\,(x + 2\,\Delta x)\,.\,.\,.\,(x + n\,\Delta x) = \frac{a\,x\,(x + \Delta x)\,(x + 2\,\Delta x)\,.\,.\,.\,.\,(x + n\,\Delta x)}{n + 1}.$$

This part of the theory has been before conſidered in the preceding pages, in deſcribing the method employed by M. Nichole of the Academy of Sciences, publiſhed in 1717.

11. Let us now conſider thoſe fractions, the denominators of which are compoſed of factors ſimilar to thoſe above deſcribed, *viz.*

$$\frac{1}{x\,(x + \Delta x)}$$

$$\frac{1}{x\,(x + \Delta x)\,(x + 2\,\Delta x)}$$

$$\frac{1}{x\,(x + \Delta x)\,(x + 2\,\Delta x)\,(x + 3\,\Delta x)} ;\ \text{\&c.}$$

in which Δx is conſtant.

Here, by taking the differences as before, we ſhall have

$$1.\quad \Delta\left\{\frac{1}{x(x+\Delta x)}\right\}=\frac{1}{(x+\Delta x)(x+2\Delta x)}-\frac{1}{x(x+\Delta x)}$$

$$=-2\Delta x\times\frac{1}{x(x+\Delta x)(x+2\Delta x)}.$$

And in the ſame manner we find the increment, or,

$$2.\quad \Delta\left\{\frac{1}{x(x+\Delta x)(x+2\Delta x)}\right\}=-3\Delta x$$

$$\times\frac{1}{x(x+\Delta x)(x+2\Delta x)(x+3\Delta x)}$$

$$3.\quad \Delta\left\{\frac{1}{x(x+\Delta x)(x+2\Delta x)(x+3\Delta x)}\right\}=-$$

$$4\Delta x\times\frac{1}{x(x+\Delta x)(x+2\Delta x)(x+3\Delta x)(x+4\Delta x)}$$

and ſo on of others. Whence it follows, that in order to determine the increment of any expreſſions of the above form, we muſt increaſe the denominator by one factor, and multiply the new fraction by the conſtant increment taken negatively and affected by ſuch a co-efficient, as is equal to the number of factors in the denominator of the reſulting fraction.

And hence, again, converſely, in order to find the integral correſponding to any increment of the form

$$\frac{a\Delta x}{x(x+\Delta x)(x+2\Delta x)(x+3\Delta x)\,..\,(x+n\Delta x)}$$

we muſt ſuppreſs the laſt factor in the denominator, and afterwards divide the reſulting fraction, taken negatively, by the product of Δx, into the number of factors compriſed in the denominator of the ſaid fraction; thus,

$$\int\frac{a\Delta x}{x(x+\Delta x)(x+2\Delta x)(x+3\Delta x)\,..\,(x+n\Delta x)}$$

$$=\frac{-a}{nx(x+\Delta x)(x+2\Delta x)(x+3\Delta x)\ldots(x+\overline{n-1}\,\Delta x)}$$

12. On the ſame principles we find

$$\Delta\left(\frac{1}{x+n\Delta x}\right)=\frac{1}{x+(n+1)\Delta x}-\frac{1}{x+n\Delta x}$$

and, therefore, reciprocally,

$$\int\frac{1}{x+(n+1)\Delta x}-\int\frac{1}{x+n\Delta x}=\frac{1}{x+n\Delta x}:$$

The integration of theſe two latter expreſſions cannot be effected ſeparately, but the difference of them is evidently equal to the algebraical fraction $\frac{1}{x+n\Delta x}$

Whence it appears, that quantities may ſometimes admit of integration, by being decompoſed into many parts; which, though they will not admit of it in their ſtate of ſeparation, may, notwithſtanding, be ſo combined with each other, that the final reſult ſhall be algebraical; a circumſtance that commonly happens in practical operations.

Examples of Integration.

13. *Ex.* 1.—Find the integral of the increment

$$\frac{3x+2\Delta x}{x(x+\Delta x)(x+2\Delta x)}.$$

This quantity admits of the following decompoſition:

$$\frac{3x+2\Delta x}{x(x+\Delta x)(x+2\Delta x)}=\frac{1}{\Delta x(x)}+\frac{1}{\Delta x(x+\Delta x)}$$

$$-\frac{2}{\Delta x(x+2\Delta x)}=\frac{1}{\Delta x}\times\frac{1}{x}+\frac{1}{\Delta x}\times\frac{1}{x+\Delta x}$$

$-\frac{2}{\Delta x}\times\frac{1}{x+2\Delta x}$: each of which parts is evidently of the form that has been inveſtigated in the preceding paragraph. By making firſt $n=0$, $n=1$, and $n=2$; thus we have

$$\int\frac{1}{x}=\int\frac{1}{x+\Delta x}-\frac{1}{x}:$$

by which means the integral of the propoſed quantity takes the following form: *viz.*

$$\frac{2}{\Delta x}\left\{\int\frac{1}{x+\Delta x}-\int\frac{1}{x+2\Delta x}\right\}-\frac{1}{x\Delta x}.$$

But the above formula gives alſo

$$\int\frac{1}{x+\Delta x}-\int\frac{1}{x+2\Delta x}=\frac{-1}{x+\Delta x}:$$

whence the whole integral is

$$\frac{1}{\Delta x}\times\left(\frac{-2}{x+\Delta x}-\frac{1}{x}\right)=-\frac{3x-\Delta x}{x\Delta x(x+\Delta x)}$$

as required.

Ex. 2.—Required the integral of the quantity

$$\frac{3\Delta x}{x(x+3\Delta x)}$$

Here we have $\frac{3\Delta x}{x(x+3\Delta x)}=\frac{1}{x}-\frac{1}{x+3\Delta x}$;

and, conſequently, the integral of the quantity will be

$$\int\frac{1}{x}-\int\frac{1}{x+3\Delta x}.$$

Now the above formula gives

$$\int\frac{1}{x}=\int\frac{1}{x+\Delta x}-\frac{1}{x}$$

$$\int\frac{1}{x+3\Delta x}=\frac{1}{x+2\Delta x}+\int\frac{1}{x+2\Delta x};$$

whence the whole integral is expreſſed by

$$\int\frac{1}{x+\Delta x}-\int\frac{1}{x+2\Delta x}-\frac{1}{x}-\frac{1}{x+2\Delta x}.$$

But $\int\frac{1}{x+\Delta x}-\int\frac{1}{x+2\Delta x}=\frac{-1}{x+\Delta x}$

by the ſame formula, and, conſequently, we have at length

$$\int\frac{3\Delta x}{x(x+3\Delta x)}=-\frac{1}{x+2\Delta x}-\frac{1}{x+\Delta x}-\frac{1}{x}.$$

Such are the elements of the direct and inverſe method of increments, and which will be found to embrace a very great number of caſes; but thoſe who wiſh for a more complete developement of the principles, cannot conſult a work better calculated to convey the neceſſary information, than the third volume of the "Traité du Calcul Differentiel, &c." par La Croix. We ſhall now conclude this article, by ſhewing the application of the foregoing theory a few examples.

Application of the Method of Increments.

14. The ſummation of ſeries, by the inverſe method of increments, is founded generally on this principle; that if we have any ſeries of quantities, as

$$a,\quad b,\quad c,\quad d,\quad e,\ \&c.$$

which are derived from each other according to ſome known law; each term may be conſidered as the increment of the ſum of all thoſe which precede it. Thus,

$$\text{let}\quad a+b+c+d+e=z$$
$$\text{and}\quad a+b+c+d+e+f=z':$$

then it is obvious, that $z' - z = \Delta z = f$; and therefore, converſely, the integral of any one of thoſe terms, conſidered as an increment, will repreſent the ſum of all the preceding part of the ſeries.

This being premiſed, we may proceed to the ſolution of the following examples.

Ex. 1. – Required the ſum of n terms of the natural ſeries

$$1+2+3+4+5+\ldots\ldots n$$

Here, by writing x inſtead of n, the term next in order will be $x+1$, which being the increment of the ſeries, we ſhall have $\int(x+1) =$ the ſum required.

Now $\int(x+1) = \int x + \int 1$; and by art. 8.

$\int x = \dfrac{x^2}{2\,\Delta x} - \dfrac{x}{2}$; and $\int 1 = \dfrac{x}{\Delta x}$.

And ſince in this caſe $\Delta x = 1$, we have

$$\int(x+1) = \frac{x^2}{2} - \frac{x}{2} + \frac{x}{1} = \frac{x^2+x}{2} = \frac{n^2+n}{2}$$

by writing again n inſtead of x, which is the ſum of n terms of the propoſed ſeries, as is alſo evident from other conſiderations.

Remark.—This example offers an eaſy illuſtration of what has been obſerved at art. 9, of the correction of an integral, which is neceſſary in many caſes, the ſame as the correction of a fluent is in the fluxional or differential calculus. Suppoſe for example, that inſtead of the preceding ſeries beginning at unity, it had commenced from any other term, as 7; the general law of formation would have been the ſame, and the increment would ſtill have had the form $x+1$; and conſequently the integral, in the firſt inſtance, would be repreſented as above; *viz.*

$$\int(x+1) = \frac{x^2+x}{2}.$$

But here a correction of the integral is neceſſary, for from the nature of the ſeries, when $x=7$, the ſum of the ſeries is 7, this being the term at which the ſeries commences; whereas, without a correction, we ſhould have the ſum $= 28$; we muſt, therefore, write

$\int(x+1) = \dfrac{x^2+x}{2} + c$; c being the correction, and ſince when $x=7$, $\dfrac{x^2+x}{2} + c = 7$; or $\dfrac{49+7}{2} + c = 7$, we find $c = -21$; after which the ſum of any number of terms of the propoſed ſeries is readily obtained. Thus for example, let $n = 16$, then the ſum of the ſeries beginning with the term 7 becomes

$$\frac{16^2+16}{2} - 21 = 115 \text{ as required.}$$

Ex. 2.—Find the ſum of the ſeries of ſquares $1^2 + 3^2 + 5^2 + 7^2 + \&c.\ n^2$.

Here the general term of the ſeries is $(x+2)^2$, and therefore the ſum required will be expreſſed by the integral of $(x+2)^2$.

Now $\int(x+2)^2 = \int x^2 + \int 4x + \int 4$; and by article 8

$$\int x^2 = \frac{x^3}{3\,\Delta x} - \frac{x^2}{2} + \frac{x\,\Delta x}{6}$$

$$4\int x = \frac{4x^2}{2\,\Delta x} - \frac{4x}{2}$$

$$4\int 1 = \frac{4x}{\Delta x}$$

And ſince in this caſe $\Delta x = 2$, we have

$$\int(x+2)^2 = \frac{x^3}{6} - \frac{x^2}{2} + \frac{2x}{6} + \frac{4x^2}{4} - \frac{4x}{2} + \frac{4x}{2}$$
$$= \frac{x^3}{6} + \frac{x^2}{2} + \frac{x}{3} = \frac{n^3}{6} + \frac{n^2}{2} + \frac{n}{3}$$

by making $x = n$.

But here again, if the ſeries do not begin at unity, it will require a correction, which will be found generally, thus: ſuppoſe the ſeries to commence at any term p; and let $x = p$, then the above formula gives the ſum of the ſeries to the term $p = \dfrac{p^3}{6} + \dfrac{p^2}{2} + \dfrac{p}{3}$, whereas it ought to be p^2; the correction therefore becomes $-\left(\dfrac{p^3}{6} + \dfrac{p^2}{2} + \dfrac{p}{3} - \dfrac{p^2}{1}\right) = -\left(\dfrac{p^3}{6} - \dfrac{p^2}{2} + \dfrac{p}{3}\right) = c$; and, therefore, the general expreſſion for any number of terms of this ſeries, between the limits p and n, will be

$$\frac{n^3}{6} + \frac{n^2}{2} + \frac{n}{3} - \frac{p^3}{6} + \frac{p^2}{2} - \frac{p}{3}.$$

Cor.—This example will alſo furniſh the ſolution of the problem, when the roots of the ſquares differ from each other by any conſtant quantity m; for it will only be neceſſary to make $\Delta x = m$, and the ſame formula will give $\int(x+m)^2 = \int x^2 + 2m\int x + m^2\int 1$

$$\int x^2 = \frac{x^3}{3\,\Delta x} - \frac{x^2}{2} + \frac{x\,\Delta x}{6}$$

$$2m\int x = \frac{2mx^2}{2\,\Delta x} - \frac{2mx}{2}$$

$$m^2\int 1 = \frac{m^2 x}{\Delta x}$$

And ſince in this caſe we have $\Delta x = m$, the ſum of theſe expreſſions becomes

$\int(x+m)^2 = \dfrac{x^3}{3m} + \dfrac{x^2}{2} + \dfrac{mx}{6} + c$, the correction; and therefore the general formula for the ſum beginning at any term p, will be

$$\frac{n^3}{3m} + \frac{n^2}{2} + \frac{mn}{6} - \frac{p^3}{3m} + \frac{p^2}{2} - \frac{mp}{6}.$$

Ex. 3.—Required the ſum of the natural ſeries of cubes $1^3 + 2^3 + 3^3 + 4^3 + \&c.\ n^3$.

Here the general term is $(x+1)^3$; and the integral of this, that is, $\int(x+1)^3 = \int x^3 + 3\int x^2 + 3\int x + \int 1$, is computed as follows:

$$\int x^3 = \frac{x^4}{4\,\Delta x} - \frac{x^3}{2} + \frac{x^2\,\Delta x}{4}$$

$$3\int x^2 = \frac{3\,x^3}{3\,\Delta x} - \frac{3\,x^2}{2} + \frac{3\,x\,\Delta x}{6}$$

$$3\int x = \frac{3\,x^2}{2\,\Delta x} - \frac{3\,x}{2}$$

$$\int 1 = \frac{x}{\Delta x}$$

And here, ſince $\Delta x = 1$, we have

$$\int (x+1)^3 = \frac{x^4}{4} + \frac{x^3}{2} + \frac{x^2}{4} = \left(\frac{x^2+x}{2}\right)^2$$

Or, by making $x = n$, the ſum required is $\left(\frac{n^2+n}{2}\right)^2$

Hence a very curious property with regard to the ſums of conſecutive cubes beginning at 1; *viz.* that this ſum is equal to the ſquare of the ſum of all their roots.

Thus, $1^3 + 2^3 = (1+2)^2$

$1^3 + 2^3 + 3^3 = (1+2+3)^2$

$1^3 + 2^3 + 3^3 + 4^3 = (1+2+3+4)^2$

&c. &c.

As to the correction in thoſe caſes that required it, it will be found as in the preceding example; as alſo the ſums of any number of cubes whoſe roots are in arithmetical progreſſion, having any common difference *m*. And the ſums of any powers whatever are attainable upon the ſame principles.

Ex. 4.—Required the ſum of any propoſed number of terms in the ſeries of triangular numbers

1, 3, 6, 10, 15, &c.

In this caſe the general term is $\frac{x(x+1)}{2}$, and it will therefore be neceſſary to find the integral of $\frac{(x+1)\,(x+2)}{2} = \frac{1}{2}\int (x+1)\,(x+2)$ but (art. 10) $= \frac{1}{2}\int (x+1)\,(x+2) = \frac{x\,(x+1)\,(x+2)}{6\,\Delta x} = \frac{n\,(n+1)\,(n+2)}{6}$ by making $x = n$, and $\Delta x = 1$.

The ſame may be otherwiſe found from art. 8; thus,

$$\tfrac{1}{2}\int (x+1)\,(x+2) = \tfrac{1}{2}\int x^2 + \tfrac{1}{2}\int 3\,x + \tfrac{1}{2}\int 2$$

$$\tfrac{1}{2}\int x^2 = \frac{x^3}{6\,\Delta x} - \frac{x^2}{4} + \frac{x\,\Delta x}{12}$$

$$\tfrac{1}{2}\int x = \frac{3\,x^2}{4\,\Delta x} - \frac{3\,x}{4}$$

$$\int 1 = \frac{x}{\Delta x}$$

And ſince $\Delta x = 1$, this ſum becomes

$$\tfrac{1}{2}\int (x+1)\,(x+2) = \frac{x^3}{6} + \frac{x^2}{2} + \frac{x}{3} = \frac{x\,(x+1)\,(x+2)}{6}.$$

And the ſums of any order of polygonal and figurate numbers may be found in the ſame manner.

Ex. 5.—Required the ſum of any number *n* terms of the ſeries

$1\cdot 2 + 2\cdot 3 + 3\cdot 4 + 4\cdot 5 +$ &c. $n\,(n+1)$

Here the general term of the ſeries is $x\,(x+1)$, it is therefore required to find the integral of $(x+1)\,(x+2)$. Firſt by art. 10. we have

$$\int (x+1)\,(x+2) = \frac{x\,(x+1)\,(x+2)}{3\,\Delta x} = \frac{n\,(n+1)\,(n+2)}{3}$$ by writing $x = n$, and $\Delta x = 1$.

The ſame may alſo be found, as in the example above, by article 8; but it is needleſs to repeat it, as it only differs from that in its conſtant factor.

We have in neither of the foregoing examples any correction, for it is obvious that when $x = 0$, the formula $\frac{x\,(x+1)\,(x+2)}{6} = 0$, as it ought to be, and therefore the integral needs no correction.

Ex. 6.—Required the ſum of any number of terms *n*, of the ſeries

$1\cdot 4\cdot 7\cdot 10 + 4\cdot 7\cdot 10\cdot 13 + 7\cdot 10\cdot 13\cdot 16 +$ &c. $n\,(n+3)\,(n+6)\,(n+9)$.

Here the general term of the ſeries is $x\,(x+3)\,(x+6)\,(x+9)$, and we have therefore to find the integral of $(x+3)\,(x+6)\,(x+9)\,(x+12)$. Now, by art. 10.

$$\int (x+3)\,(x+6)\,(x+9)\,(x+12) = \left\{\begin{array}{l} \dfrac{x\,(x+3)\,(x+6)\,(x+9)\,(x+12)}{5\,\Delta x} = \\ \dfrac{n\,(n+3)\,(n+6)\,(n+9)\,(n+12)}{15} \end{array}\right.$$

by writing $x = n$, and $\Delta x = 3$.

Ex. 7.—Required the ſum of the infinite ſeries

$$\frac{1}{1\cdot 2\cdot 3} + \frac{1}{2\cdot 3\cdot 4} + \frac{1}{3\cdot 4\cdot 5} + \frac{1}{4\cdot 5\cdot 6} + \text{\&c.}\ \frac{1}{n\,(n+1)\,(n+2)}.$$

Here the general term of the ſeries is $\frac{1}{x\,(x+1)\,(x+2)}$; and the moſt ſimple idea is now to conſider the ſeries as generated from its extremity, which is infinitely diſtant; under which circumſtance each term will be the increment of all thoſe which follow it in the above arrangement; and therefore, in order to find the ſum beginning at any term $\frac{1}{x\,(x+1)\,(x+2)}$, we have ſimply to find the integral of $\frac{1}{(x-1)\,(x)\,(x+1)}$ taken negatively, becauſe the increment *x*, that is, $\Delta x = -1$. Now, by art. 11,

$$\int \frac{1}{(x-1)\,(x)\,(x+1)} = \frac{1}{\Delta x} \times \frac{-1}{2\,x\,(x+1)} = \frac{1}{2\,x\,(x+1)},$$

becauſe $\Delta x = -1$; that is, the ſum of the above infinite ſeries beginning at any term $\frac{1}{n\,(n+1)\,(n+2)}$ is equal to $\frac{1}{2\,n\,(n+1)}$; and therefore when $n = 1$, the whole ſeries becomes $= \frac{1}{4}$.

Cor. Having thus found the ſum of the whole ſeries, we may readily find the ſum of as many terms as we pleaſe, for we have ſeen that the ſum beginning at the *n*th term from the firſt, is $\frac{1}{2n(n+1)}$; and therefore, beginning at the $(n+1)$th term, the ſum will be $= \frac{1}{2(n+1)(n+2)}$; which laſt ſum taken from the whole ſum $\frac{1}{4}$, will leave that of the firſt *n* terms, that is,

$$\text{ſum } n \text{ terms} = \frac{1}{4} - \frac{1}{2(n+1)(n+2)} = \frac{(n+1)(n+2)-2}{4(n+1)(n+2)}$$

Thus, if $n = 1$, ſum $= \frac{1}{6}$; if $n = 2$, ſum $= \frac{5}{24}$; if $n = 3$, the ſum $= \frac{9}{40}$, &c.

Ex. 8.—Find the ſum of the infinite ſeries

$$\frac{1}{1 \cdot 5} + \frac{1}{5 \cdot 9} + \frac{1}{9 \cdot 13} + \frac{1}{13 \cdot 17} + \text{\&c.} \; \frac{1}{n(n+4)}$$

Here the general term of the ſeries being $\frac{1}{x(x+4)}$; we ſhall, on the ſame principles as in the preceding example, have to find the integral of $\frac{1}{(x-4)x}$.

Now by art. 11.

$$\int \frac{1}{(x-4)x} = \frac{1}{\Delta x} \times \frac{-1}{x} = \frac{1}{4x}; \text{ becauſe } \Delta x = -4.$$

Making, therefore, $x = 1$, we have $\frac{1}{4}$ for the ſum of the whole ſeries, beginning at the firſt term. We might have added here a variety of other examples, had the limits of the article admitted of it, but ſuch as are given will be found to apply in a number of caſes; and will indicate to the intelligent reader the method of application in many others, which are reducible to ſimilar principles. It will be proper, however, before we diſmiſs this ſubject entirely, to ſay a few words on the celebrated theorem of Dr. Taylor, the learned author of this theory. This theorem may be expreſſed as follows:

Let Y′ repreſent any function whatever of the variable quantity x; then if x be increaſed by any difference Δx, the value Y, that is $Y + \Delta Y$, becomes (adopting the differential notation) $Y + \Delta Y = Y + \frac{\Delta x \, dY}{1 . dx} + \frac{\Delta x^2 \, d^2 Y}{1 . 2 . dx^2} + \frac{\Delta x^3 \, d^3 Y}{1 . 2 . 3 dx^3} + \frac{\Delta x^4 \, d^4 Y}{1 . 2 . 3 . 4 dx^4}$ &c. or, $\Delta Y = \frac{\Delta x \, dY}{1 . dx} + \frac{\Delta x^2 \, d^2 Y}{1 . 2 . dx^2} + \frac{\Delta x^3 \, d^3 Y}{1 . 2 . 3 dx^3} + \frac{\Delta x^4 \, d^4 Y}{1 . 2 . 3 . 4 dx^4}$ + &c. where the law of continuation is obvious, and requires no farther developement; it muſt, however, be remarked, that when Δx is negative, the terms of the above ſeries muſt be taken plus and minus alternately; and it will therefore be more generally expreſſed by

$$\pm \Delta Y = \frac{\Delta x \, dY}{1 \, dx} \pm \frac{\Delta x^2 \, d^2 Y}{1 . 2 \, dx^2} + \frac{\Delta x^3 \, d^3 Y}{1 . 2 . 3 \, dx^3} \pm \text{\&c.}$$

In order then to find the increment of any function of a variable quantity, we muſt take the ſucceſſive order of its fluxions, by which means all the fluxional parts in both the numerator and denominator will diſappear; and we ſhall have the value of ΔY expreſſed in terms of x and Δx; and this expreſſion will always be finite, unleſs the function be tranſcendental.

Let us propoſe the function $Y = ax + bx^2 + x^3$ to find the value of Y′, when x becomes $x + \Delta x$.

$$\begin{aligned} d . Y &= a\,dx + 2bx\,dx + 3x^2\,dx \\ d^2 Y &= 2b\,dx^2 + 6x\,dx^2 \\ d^3 Y &= 6\,dx^3 \\ d^4 Y &= 0 \end{aligned}$$

Now theſe values being ſubſtituted in the general ſeries, we ſhall have for the increment of Y,

$$\Delta Y = \Delta x (a + 2bx + 3x^2) + \Delta x^2 (b + 3x) + \Delta x^3$$

Again, given $Y = ax + bx^2 - cx^3 + x^4$, to find the increment of Y.

$$\begin{aligned} d Y &= a\,dx + 2bx\,dx - 3cx^2\,dx + 4x^3\,dx \\ d^2 Y &= + 2b\,dx^2 - 6cx\,dx^2 + 12x^2\,dx^2 \\ d^3 Y &= - 6c\,dx^3 + 24x\,dx^3 \\ d^4 Y &= + 24\,dx^4 \\ d^5 Y &= 0 \end{aligned}$$

Whence making theſe ſubſtitutions in the general theorem, we have

$$\Delta Y = \begin{cases} \Delta x(a + 2bx - 3cx^2 + 4x^3) + \Delta x^2 (b - 3cx + 6x^2) \\ + \Delta x^3 (c + 4x) + \Delta x^4. \end{cases}$$

Theſe examples will explain the method of applying the theorem to any caſe that may ariſe, it being as univerſal in its application in the theory of increments, or differences; as the binomial theorem is in the expanſion of roots and powers; but, like the latter, it was left by its author without demonſtration: it has, however, received many ſince from ſeveral able mathematicians, though there is no one of them perhaps that is quite ſo ſatisfactory as might be wiſhed; Maclaurin's reſts upon the fluxional calculus, which it would be deſirable not to introduce, if it could be obtained from more evident and obvious principles. Another demonſtration of this theorem, and which is conſidered the moſt ſatisfactory of any that has yet appeared, is given by l'Huilier of Geneva, in his work entitled "Principiorum calculi diff. et integr. expoſitio elementaris," in 4to. publiſhed in 1795.

INCROACHMENT, in *Law*. See ACCROCHING.

INCRUSTATION, the lining or coating of a wall, either with gloſſy ſtones, ruſtics, marble, pottery, or ſtucco-work; and that either equably, or in panels and compartiments.

INCRUSTATION, in *Natural Hiſtory*, is one of the modes in which organic remains are preſerved in the earth: the petrifying or incruſting matter, forming ſo thin a coat or cruſt around the extraneous foſſil, that its external form is nearly preſerved on the ſtony incruſtation. Mr. William Martin claſſes theſe among the artificial genera of reliquia; and obſerves, "Outlines," p. 177, note, that "the common calcareous incruſtations of our rivers, &c. have been ranked as petrifactions; but, with more propriety, may be conſidered as incipient matrices." If the coat of mineral matter be too thick to exhibit externally the exact figure of the foſſil which it covers, ſuch are called by this author ſub-incruſting matrices, of which ironſtone nodules incloſing leaves of plants, &c. are well-known examples. The petrifying ſprings of Derbyſhire, (for a liſt of which, ſee Mr. Farey's Report on that county, vol. i.) and other calcareous diſtricts, are well known for the curious and whimſical incruſtations which are there in a ſhort time produced.

INCRUSTED, or INCRUSTATED *Column*. See *Incruſtated* COLUMN.

INCUBATION, in *Comparative Anatomy*, is the term applied to the conduct of moſt birds in reſting or ſitting upon their eggs, in order to communicate to them the neceſſary degree of warmth for the excitement of their internal parts, and the developement of the fœtus.

The phenomena produced by incubation are ſo intereſting, on account of their exhibiting in a palpable manner the progreſs of fœtal exiſtence, that they have been ſtudied by almoſt every reſpectable phyſiologiſt. Writings have been left upon this ſubject by Ariſtotle, Hippocrates, Fabricius ab Aquapendente, Aldrovandus, Coiter, Veſling, Harvey, Langly, Schrader, Theod. Aldes, Stenon, Needham, Malpighi, Maitre Jan, Haller, Hunter, Monroe, &c. beſides ſome later obſervations by Blumenbach, Leveille, and other continental anatomiſts. Notwithſtanding the labours of ſo many eminent men, ſome of the moſt important points in the hiſtory of incubation remain ſtill undetermined. The beſt treatiſes are thoſe of Malpighi, Maitre Jan, and Haller, but even in theſe authors there are many errors to correct, and, except ſome detached figures that have been publiſhed to illuſtrate particular parts of this ſubject, we do not poſſeſs any tolerably good plates.

The deficiency and doubts that ſtill remain, with reſpect to ſeveral parts of the hiſtory of incubation, prove how difficult it is to inveſtigate the ſubject.

The membranes of the egg, and the organs of the chick, are in general ſo tender, that they do not admit of being eaſily or ſatisfactorily examined; and when prepared by immerſion in ſpirits, acids, or other aſtringent liquors, their natural appearances and connections are much obſcured.

The progreſs in the growth of the membranes is found to be in many circumſtances unlike what would be expected, and what it appears to be; and the attachments of the membranes to each other are extremely intricate and perplexing. This part of the anatomy of the incubated egg, therefore, principally requires improvement. In the following article we have endeavoured to ſupply, by our own obſervations, what was deficient in the hiſtory of incubation, but, we muſt confeſs, not with as much ſucceſs as we could wiſh; there are ſeveral anatomical points upon which we are obliged to ſpeak doubtfully, and we have not been able to ſatisfy ourſelves reſpecting the uſes attributed to ſome of the parts of the incubated egg, although we believe others will be found to be elucidated by the experiments we have made, and which are here related.

Moſt writers upon incubation, appear to us to have paid too much regard to the dates or periods at which they have obſerved the different events of incubation to occur. Much exactneſs with reſpect to dates is not of material conſequence, and if it were, it is not practicable, for the progreſs of incubation depends ſo much upon climate, ſeaſon, and the diligence of the parent, with many accidental circumſtances, that hardly any two eggs agree preciſely in their ſtate of growth, at any given period of incubation: we are not, therefore, to wonder at the difference amongſt writers upon this ſubject with reſpect to chronology.

The proper heat for the hatching of hens' eggs is 104° of Fahrenheit; to which degree the ſurface of the body of the hen will raiſe the thermometer when ſhe ſits upon her eggs. In thoſe birds that do not ſit conſtantly, but truſt to the heat of the ſun, the temperature of the eggs is probably below 104 degrees.

The full period of incubation by the *hen*, in this country, is well known to be 21 days. In warmer climates it is ſaid to be a day or two leſs. The periods of incubation vary much in different ſpecies of birds: we introduce the following table, which has been compiled from different authors by count Morozzo, in a letter from him to Lacépède, to ſhew the periods of incubation compared with thoſe of the life of certain birds.

Names of Birds.	Periods of their Incubation.	Duration of their Life.	Authority.
	Days.	Years.	
Swan	42	about 200	Aldrovandi.
Parrot	40	—— 100	Wolmaer.
Gooſe	30	80 or more	Willoughby.
Eagle	30	period of life not known.	
Buſtard	30		
Duck	30		
Turkey	30		
Peacock	26 to 27	25 to 28	Ariſtotle and Pliny.
Pheaſant	20 — 25	18 — 20	A Treatiſe on Pheaſants.
Crow	20	100 or more	Heſiod.
Nightingale	19 to 20	17 to 18	Buffon.
Hen	18 — 19	16 — 18	Buffon.
Pigeon	17 — 18	16 — 17	Several obſervations.
Linnet	14	13 — 14	Willoughby.
Canary	13 to 14	13 — 14	A Treatiſe on theſe Birds.
Goldfinch	13 — 14	18 — 20	Buffon.

Crane and *heron*, as well as *oſtrich*, hatch their eggs chiefly by the heat of the ſun. Journ. de Phyſique Ventos. an. 10.

The uſual mode of examining the progreſs of incubation, is to gently fracture the ſhell, and pick it carefully off in pieces with a pair of forceps. This ſhould be done at the large end, as it is there the changes of incubation commence, and at all periods it will be found the moſt convenient place for breaking the ſhell, on account of the air-cell being interpoſed between it and the fluids of the egg. For particular purpoſes other modes of preparation muſt be employed. If it be our object to ſtudy the formation of the membranes, theſe muſt be ſeparated from the humours, and after being cleanſed by being paſſed through ſeveral waters, they are to be floated in weak ſpirits over a blue paper, or ſome other dark coloured ſubſtance. The ſtrongeſt ſpirits, diſtilled vinegar, or a ſolution of alum, are neceſſary to render the organs of the fœtus ſufficiently plain for examination. The only uſe of boiling the contents of the egg, is to ſhew the relative ſituation and magnitude of different parts.

In many obſervations, it is neceſſary to magnify by glaſſes the ſubjects of inveſtigation; we would however recommend, that the ſight be only aſſiſted by the ſingle lens. When a higher power is employed it is liable to deceive.

After the egg has been ſat upon for 12 *hours*, the quantity of *air* contained between the two layers of the membrane that lines the ſhell, is found to be a little increaſed.

No evident change is yet to be obſerved with reſpect to the bulk or conſiſtence of the *humours*.

The *white* ſpot on the ſuperior ſurface of the yolk, which contains the *cicatricula* of the ancient anatomiſts, or the *follicle* of Haller, is now ſomewhat enlarged. There appears, in its interior, a ſmall white body of an elongated and indiſtinct figure, which is ſurrounded by a line of a deep yellow or greeniſh colour. If this part of the membrane be removed and examined with a lens on the under ſurface, after being a ſhort time immerſed in ſpirits or vinegar, it will be diſcovered that the elongated white body is the rudiment of the *fœtus*, which is already incloſed in the *amnios*. The greeniſh appearance would ſeem to depend partly upon the exiſtence of the amnios, and partly upon a depreſſion on the ſubſtance of the yolk, which is the origin of the bed of the chick. We cannot determine whether this depreſſion contains a fluid or not. The part of the white ſpot which ſurrounds the depreſſion that contains the fœtus, is occaſioned by the ſubſtance of the yolk having a peculiar organization. At that point it is white, and has a curdy or coagulated appearance. Malpighi believed that he could diſcern the fœtus as early as the ſixth hour, and even before the egg had been ſat upon; but moſt other obſervers have not been able to ſee any appearance, which they thought deſerved to be conſidered as the fœtus, before the 12th hour. It is, however, probable, that the embryo of the chick is formed after impregnation, although from its extreme tenderneſs and obſcurity of figure, it cannot be detected until it is a little developed by incubation.

The *amnios* appears to be coeval with the chick.

The *rings* or *circles* (*halones*) that ſurround the cicatricula, are now ſomewhat enlarged, and more defined in their outline. They alſo aſſume a little of an oval figure. The external circle is undulating, or forms waves, through which the colour of the yolk appears. Maitre Jan deſcribes four halones, Haller only three; we have found the number vary. This appearance of circles is not eaſily accounted for. We have thought it aroſe from the ſeparation of the membranes into their proper layers.

Firſt Day, or after 24 *Hours.*—Upon opening an egg at this period, it is perceived that the ſpace formed for the admiſſion of air between the layers of the external membrane is a little more enlarged.

The *external white* appears ſcarcely diminiſhed; it is fluid and tranſparent, and runs out at the opening if the egg be inclined to that ſide.

The *yolk* is found to float higher in the principal white than before incubation, and appears a little flattened upon the upper ſurface.

The *halones* are more extended, particularly the outer one. The internal one has acquired a little of a heart-ſhape, and is ſurrounded by a more defined line of a greeniſh colour, which is the firſt appearance of the outline of the veinous area. There are alſo ſome faint and imperfect traces of green veſſels, or rather elongated points, to be detected in different parts of the ſpace incloſed by this line, which are the rudiments of the veſſels that are to compoſe the area.

The *amnios* is well formed, and compoſed of two circles which unite two ſtraight lines, reſembling the figure of a peſtle.

The *fœtus* has a more determined figure; it is larger at both extremities than in the middle; but the end which correſponds to its head is larger than the other, and forms an oval maſs. Maitre Jan ſtates that if an egg, after being under the hen for 24 hours, be put into water, it will float with the ſmall end downwards, which is a proof that a part of its fluids is loſt, and replaced by the admiſſion of air into the air-cell at the great end of the egg.

After 36 *hours* we have found the greeniſh line, already mentioned, to have ſtill more plainly the appearance of a veſſel. It encompaſſes a larger area, and aſſumes more completely the contour of a heart. The greeniſh points alſo now are continued into each, and put on the appearance of veſſels, which are moſt numerous next the circumference of the area, but preſent no evident connection with the fœtus. Some of theſe veſſels are ſeen to contain red blood, more particularly thoſe which paſs between the head of the chick and the upper part of the veſſel in ſhape of a heart. In ſome eggs, at this period, we have found theſe red veſſels approach the chick but not join it: in others they were collected by a ſingle branch, which paſſed behind the head of the chick. This branch Leveillé has called the meningo-cardiac vein, and others the vena aſcendens. There is conſiderable variety with reſpect to the period at which red veſſels begin to appear. We have ſeen them before the 36th hour, but oftener, perhaps, not before the 40th, or even later. Authors differ extremely on this point. Malpighi repreſents the commencement of the veſſels at the 30th hour (Append. figs. 18 and 19.), and even delineates them at the 12th hour. (Epiſt. 1. fig. 5.) Stenon obſerved them at the 71ſt hour; Veſling at the 43d, but ſaw the points at the 42d hour. Aldrovandus found them the third day. Maitre Jan deſcribed the firſt appearance of veſſels at the 38th hour, and repreſented them diſtinctly formed, and carrying red blood at the 44th hour. (P. 53 and 58, and fig. 10.) Haller noticed ſome reddiſh points at the 36th hour, and to the 48th, but did not perceive perfect red veſſels before the end of the third day. Memoire 2d ſur la Formation du Cœur dans le Poulet, &c. p. 23.

Theſe contradictory accounts depend in ſome degree upon their authors not having ſufficiently attended to the exiſtence of colourleſs points and veſſels before the formation of red blood.

Haller ſtates, that he obſerved, at 31½ hours, the head of the *fœtus* to have the appearance of being ſplit, which he attributed to the veſicles of the brain having a ſmall degree of opacity, whilſt the membranes compoſing the cranium were ſo tranſparent as to be ſeen through. Malpighi alſo repreſented this appearance. We have not noticed it.

Haller likewiſe deſcribes the head of the chick to begin to form at a right angle with the tail at the 40th hour.

After 48 *hours, or two days*, the external *halones* occupy a conſiderable extent upon the ſurface of the yolk, and become fainter in their appearance.

The *liquid* or *external white* is ſomewhat diminiſhed.

The *principal white* begins to ſubſide to the bottom and ſmall end of the egg.

The *yolk-bag* appears flatter upon the upper ſurface, and its contents are a little more fluid than before incubation.

The *chalazæ*, which were originally ſituated at the two poles of the yolk-bag, are now found ſomewhat below them, and conſequently rather nearer to each other.

The *vaſcular area* (*figure veineuſe* of Haller) is now in general completely formed with colourleſs and red veſſels. The number of the latter is very variable. We have found them at this period in very different ſtates of advancement, but always diſcoverable by the greeniſh veſſels which precede them. The area has very perfectly the figure of a heart, except that the part correſponding to the baſis is formed by the outline of the two ſides being conſiderably curved before their junction in the middle, at which place the outline of the area forms a pointed projection downwards, which nearly reaches to the head of the fœtus. It is this part of the area which receives the branches of the meningo-cardiac vein already mentioned. The veſſels are now alſo connected with the chick by means of their principal trunks.

The *pulſation* of the *heart* is evident at this period, and even in ſome hours before, according to Maitre Jan's obſervations. It appears to be produced by the alternate contraction and dilatation of two or ſometimes three veſicles. This appearance is the *punctum ſaliens* of the older anatomiſts, and has been commonly, but erroneouſly, reputed the firſt action of life.

One mode of preparing eggs for examination is to remove a portion of the membranes including the fœtus and vaſcular figure around it, and having waſhed off any pieces of the yolk that may adhere to them, immerſe them for a ſhort time in ſtrong ſpirits or diſtilled vinegar, by which means the pulpy ſubſtance that compoſes the chick is rendered opaque and viſible, and the ſtructure of the membranes more diſtinguiſhable.

If this ſtep be taken with the egg at the preſent period, or even before it, a fine gloſſy tranſparent membrane will be found upon the external ſurface of the yolk-bag, which is very readily detached, leaving the fœtus and the vaſcular area beneath. This membrane, we conceive, is the ſame which, ſtrengthened by the veſicula umbilicalis, becomes the one which at laſt entirely envelopes the contents of the incubated egg.

The membrane, containing the *vaſcular area* at the ſecond day, may be diſtinguiſhed to be compoſed of two layers; the external is ſmooth, and receives the veſſels; the internal is a little thickened and ſpongy. The remaining portion of the yolk-bag is not ſeparable into different layers. From hence it would appear that the diviſion into layers is the conſequence of veſſels being diſtributed to the membrane.

The *amnios* is now found a little larger, and the tranſparent fluid with which it is filled in greater quantity. The ſuperior circle alſo, or that which incloſes the head of the chick, is larger than the lower.

The *fœtus* has altered its ſhape a little. The head has acquired ſomething the figure of the ace of clubs, the anterior prominence of which correſponds to the noſe and mouth; and the two other projections are the veſicles containing the brain in a very ſoft pellucid ſtate. Maitre Jan ſtates that the eyes alſo are viſible at this period. (P. 77.) Haller did not ſee the eyes before the 51ſt hour, at which time they had not any colour, and were merely diſtinguiſhable from the other parts of the head, by their prominences and ſituation. Sect. xii. Second Memoir.

The *heart*, before the chick is removed from the membranes, and rendered opaque by immerſion in ſpirits, appears to be ſituated on the outſide of the body, and the pulſating points ſeem unconnected with each other; but upon a cloſe examination it is ſeen that the heart is not uncovered, although, from its projection, and the natural tranſparency of the parietes of the cheſt, it had every appearance of being ſo. The heart altogether reſembles a horſe-ſhoe in form, or a portion of a circle, of which the convexity is turned forwards, and the limbs backwards, one being directed to the upper part of the cheſt, and the other to the lower. The heart at this time conſiſts of an auricular canal, a ventricle, and a bulbous enlargement belonging to the aorta. The two laſt are the ſalient points, and when the chick is ſo far advanced that the auricle is formed and pulſates, which is ſometimes the caſe at the 48th hour, there are three ſalient points to be ſeen. Maitre Jan deſcribes four ſalient points, and ſuppoſes that they are the rudiments of the two ventricles and two auricles of the heart. At other times, he ſays he has ſometimes ſeen but three pulſating points, or perhaps two, or only one. Haller, who paid particular attention to the developement of the heart of the chick, contradicts Maitre Jan's account. At the 48th hour he could diſcover but two ſalient points; at the 50th hour he ſaw three, but on no occaſion more than that number. He ſuppoſes that when there are two ſalient points the auricle does not pulſate, and when only one the bulb of the aorta is without motion. Memoire 1. p. 83.

The End of the third Day, or Seventy-two Hours.—This is a very important period in the hiſtory of incubation.

The ſeparation of the layers of the external membranes for the admiſſion of air continues to increaſe.

The *halones* are ſcarcely to be diſcovered. The *yolk* is more extended, and the *white* continues to gravitate to the lower parts of the egg.

The *vaſcular area* is now generally found to be perfected with red veſſels. The contour of the area is more extenſive, particularly in the tranverſe direction. The diameter being now about an inch and a quarter, it has therefore leſs the ſhape of a heart: the pulſation of the three veſicles, and diſtribution of the blood-veſſels, are very clearly ſeen through the tranſparent membrane which covers them.

The *amnios* begins to aſſume the figure that it is afterwards to poſſeſs. The two circles which encompaſs the head and the tail of the fœtus become enlarged, principally on the fore-part, or the ſide next the right-hand of the obſerver; but the ſac is a little contracted on the ſame ſide oppoſite to the umbilicus of the chick, thus tending, in a degree, to give the amnios the form of a kidney.

The *fœtus* has a curved poſition forwards, and its body appears larger in proportion to its head, than on the preceding day.

We have forborne to deſcribe particularly the *heart* and *blood-veſſels* of the chick and area until the preſent period, when they are more diſtinctly ſeen.

In order to diſcern perfectly theſe parts, the membrane including the fœtus and vaſcular area ſhould be removed from the yolk-bag, floated in clear water, and examined with a lens. The vaſcular area contains four or five principal veinous branches, which ramify upon the membrane, and produce a very cloſe and intricate net-work towards the circumference of the area. Theſe branches appear, when the chick is in the natural ſituation, to be ſo many diſtinct trunks. Two of them are ſeen to come from the ſides of the chick, a third from under the tail, and one, or ſometimes two, branches from under the head of the chick. The two firſt are commonly called the *umbilical* veſſels, as they come out of the chick at the umbilicus: they would, perhaps, with more propriety, be called meſenteric veins, as we have much reaſon for ſuppoſing that they are the ſame which are ſo plainly branches of the meſenteric vein in the latter ſtages of incubation. At the preſent period they terminate in the vein which correſponds to the vena cava and vena portæ. Both the branches which emerge from under the tail and head of the fœtus are found to be given off from the umbilical veins juſt outſide the body of the chick. This origin is concealed from view until the lower ſurface of the membranes and chick are carefully examined. Several anatomiſts ſeem to have publiſhed errors with reſpect to the ſuperior or aſcending veſſels of the vaſcular area. They are often deſcribed as diſtinct branches, which are loſt on each ſide of the notch or chink, which has been already mentioned to exiſt during the firſt days of incubation in the contour of the vaſcular area. They were, therefore, ſometimes ſuppoſed to be ſeparate veſſels. Langly repreſented them to be at firſt diſtinct branches, which united at the 61ſt hour; but Malpighi, Maitre Jan, Haller, &c. ſtate that theſe two branches always unite into one behind the head of the fœtus when they do not ſooner. Malpighi, Maitre Jan, and others, however, repreſent this veſſel as coming from the heart: Maitre Jan even ſuppoſes it may be the aſcending aorta. Our obſervations, nevertheleſs, lead us to agree with Haller reſpecting this veſſel, who ſtates it to be a branch of the umbilical vein. It is this veſſel to which Leveille has given, as we conceive improperly, the name of *meningo-cardiac vein.*

The veſſel which forms the contour of the vaſcular area has been commonly deſcribed as a ſingle vein: Malpighi, however, repreſented it as being compoſed of an intertexture, or plexus of the ultimate branches of the veins which are ſpread over the vaſcular figure. There appears to be ſome foundation

tion for both theſe accounts, according to our obſervations: thus we have ſometimes ſeen with a lens the appearance deſcribed by Malpighi, and at the ſame time the ſingle trunk nearly tranſparent from wanting red blood, and enveloped and concealed by the intricate and cloſe plexus formed by the extremities of the veins of the external part of the area. We believe, however, that there is in every caſe originally a ſingle veſſel which makes the outline of the veinous figure or area, and which exiſts previouſly to the veſſels which communicate with the chick. It is not uncommon to find this veſſel deficient at ſome parts of the circumference of the area, more eſpecially at the ſuperior part, where the outline makes the pointed projection inwards towards the head of the chick. Sometimes a vein is ſeen to paſs acroſs the chink formed by the outline at this part.

The arteries which go to the vaſcular area bear no proportion to the veins. They are ſo ſmall that they are not eaſily ſeen, and even have been by ſome ſuppoſed not to exiſt. The left umbilical artery is in general much more conſiderable than the right; indeed we have ſometimes doubted whether the latter exiſted or not. They accompany the veins in their courſe, but are not ſuppoſed to have any immediate connection with the veſſel which forms the contour of the area. Beſides the ſmall ſize of the arteries at this period of incubation, they are difficult to diſcover on account of all the blood-veſſels of the egg carrying blood of the ſame colour. During the firſt days the blood is a bright ſcarlet, or poſſeſſes an arterial character. The parts compoſing the heart of the chick, although formed ſeveral hours before, are now particularly evident. The vein, which in the firſt periods conveyed the blood from the vaſcular area to the horſe-ſhoe dilatation correſponding to the heart, is now ſeen to be the vena cava, or rather it ſhould be conſidered as the vena portæ and cava together. At the ſuperior part of this vein a dilatation is formed, which is prolonged tranſverſely forwards, and inclines a little downwards. This dilated part, in which the vena cava ends, is the origin of the ſingle auricle of the heart of the fœtus, and is the firſt veſicle in order which is ſeen to pulſate.

Towards the end of the third day, according to Haller, the enlargement of the head of the vena cava becomes greater, and is diſtinguiſhed from the reſt of the vein by a whitiſh-coloured interval; it is ſtill, however, but a ſingle cavity: its greateſt diameter is acroſs from the right to the left ſide of the fœtus. The canal which conveys the blood from the auricle into the ventricle (*le canal auriculaire* of Haller), exiſts, as already mentioned, before the vena cava becomes dilated to form the auricle, at which time it might be conſidered as the continuation of the cava. This canal is, therefore, one of the firſt formed parts of the heart. It is moſt long and ſlender when it firſt appears, and gradually contracts in length, until it is loſt in the ſubſtance of the heart. It is ſmalleſt where it ariſes from the auricle, and wideſt where it opens into the ventricle: its diameter, however, is always leſs than that of the latter. It enters the ventricle on the left ſide, for which purpoſe it deſcends a little, and therefore croſſes the aorta, which ariſes from the ventricle on the right ſide and aſcends backwards. There ariſes from the decuſſation of theſe two veſſels the appearance of a kind of knot, and the auricular canal ſeems to double upon itſelf, in order to be continued with the aorta in the oppoſite and concealed ſide of the knot.

When the auricular canal is viewed on the right ſide, its extremity is concealed, and the manner in which it opens into the ventricle cannot be perceived: it ſeems rather as if ſeparated from the ventricle by a line which is the border of the heart. But if it be viewed on the left ſide, there is no difficulty in diſcovering its communication with the ventricle.

The *ventricle* is a ſingle cavity during the firſt four or five days of incubation; or rather, the left ventricle exiſts only at that period. When the two ventricles make their appearance, it is in conſequence of the right ventricle being added to that which had already been formed. The left, or ſingle ventricle, ariſes out of the ring-ſhaped veſſel, which conſtitutes the firſt appearance of the heart, and probably is the firſt point which pulſates. It is an oval veſicle, with tranſparent parietes in the commencement; but it ſoon acquires more of a conic figure, with a pointed apex, and greater thickneſs and muſcular power: it is, however, very nearly oval at the preſent period.

The *aorta*, as already mentioned, is coeval with the firſt appearance of the heart, and exiſts before the formation of the auricle. It is then very long, and its arch is much greater in proportion to the length than in the ſucceeding periods of incubation, as in the adult bird. It makes an extenſive curve backwards, in order to enter the cheſt, immediately under the head, and compoſes a conſiderable part of the ring which repreſents the heart. On the left ſide this artery appears as if cut off by a line which terminates the heart. The auricle, when formed, is ſurrounded by the arch of the aorta, which is ſuperior, and more forwards.

A few hours after, the part of the aorta which appears to be outſide the cheſt, becomes ſhorter, and ſome inequality is perceived in its diameter. The part of the aorta, which immediately ariſes from the ventricle, is more contracted than any other; and the wave of blood which is ſeen to paſs through it is very ſlender. Haller gives the name of the *ſtrait* (*le détroit*) to this part.

The next part of the aorta is a dilatation, to which Haller has given the name of the *bulb* of the aorta. This portion of the veſſel, as already mentioned, conſtitutes one of the pulſating points, and is ſeen to beat even before the auricle. The bulb of the aorta has been miſtaken by Malpighi for the left ventricle, which, conſidering its lively and early pulſation, was not unnatural. He likewiſe was led by the ſame error to take the ſingle ventricle, which is actually the left for the right, or pulmonary ventricle of the heart.

The third portion of the aorta is cylindrical; its direction is changed, and it repreſents with the preceding a point or beak. It is ſmaller than the bulb, but larger than the branches which go to produce the dorſal aorta. Haller calls this part the *bec de l'aorte*.

Soon after the preſent period, and before the end of the fourth day, there are branches ſeen to ariſe from the beak of the aorta, in order to form the dorſal portion of that veſſel.

The three parts which compoſe the heart of the fœtal chick pulſate ſo rapidly, when examined immediately after the egg is opened, that the eye cannot follow them; but in proportion as the chick becomes cold and feeble, the intervals between the pulſations become longer. The pulſations may be thus gradually reduced to fifteen, to ten, to five, or two, or at laſt even to but one in a minute; nevertheleſs, the celerity with which each contraction is performed is ſcarcely diminiſhed.

When the pulſations of the heart are rendered ſufficiently ſlow to be counted, they are perceived to follow each other in a regular ſucceſſion. The auricle always beats the firſt of the three veſicles. In its ſyſtole the point deſcends, and the ſides are approximated; it ſcarcely ever appears to expel entirely the drop of blood it contains, and therefore it retains almoſt conſtantly a degree of red colour.

The wave of blood which proceeds from the auricle appears to vaniſh, as one cannot ſee its courſe into the ventricle unleſs the heart be beheld obliquely from above: then the blood will be ſeen to paſs along through the auricular canal, which, as before obſerved, is concealed by the ventricle.

The contraction of the ventricle ſucceeds to that of the auricle: it approximates its ſides, and becomes narrower and ſhorter. The ventricle frequently becomes quite pale during its contraction, owing to the entire expulſion of its contained blood.

After the contraction of the ventricle follows that of the bulb of the aorta, which pulſates as quickly and perfectly as the ventricle itſelf. It empties itſelf completely at each contraction, and therefore appears quite pale at theſe moments.

The pulſatory movement terminates at the origin of the three veſſels which go to form the dorſal aorta, and this veſſel declines very much in bulk oppoſite to the umbilicus; the branches which go to ſupply the inferior parts of the fœtus being very inſignificant.

The different *membranes* become more diſtinct at the end of the third day than they were before. At this period alſo the firſt appearance is ſeen of that remarkable membrane, which is called by ſome *allantois*, and by others *veſicula umbilicalis*.

When a portion of the membrane is removed containing the vaſcular area and the chick, and waſhed and ſpread out in clear water, it is found to contain four layers. The firſt is thin, tranſparent, and ſhining, and reſembles that which forms the yolk-bag before incubation. It very readily ſeparates from the other layers. The ſecond is alſo tranſparent, and ſtill thinner than the firſt, but is more adherent to thoſe underneath it. The third is the membrane in which the blood-veſſels are diſtributed that form the vaſcular area; and the fourth is the internal or ſpongy membrane of the yolk-bag. The third membrane ſeems to grow with the vaſcular area, by which it appears to be bounded: the internal membrane of the yolk-bag is at this period a little ſpongy or villous at every part, but much more ſo under the vaſcular area than at any other place.

The chick incloſed in the amnios is ſituated between the two firſt and two laſt of theſe membranes.

The *veſicula umbilicalis*, when firſt diſcovered, makes its appearance as a ſmall ſpherical tranſparent bag, which projects out of the opening into the abdominal cavity of the chick, that is left by the reflection of the amnios inwards. At this period, and for ſome time afterwards, it is diſtended by a clear fluid.

The end of the fourth day, or ninety-ſix hours, the appearance of *halones* is in general no longer to be perceived.

The *vaſcular area* is ſo much extended that it occupies near the half of the ſuperficies of the yolk: the outline has no remains of the heart ſhape, but has aſſumed an oval figure, the greateſt diameter of which is in the tranſverſe direction of the chick.

The *air-cell* continues to enlarge at the great end of the egg.

The *external* or *liquid white* appears to be all conſumed.

The *principal white* is chiefly to be found in the lower parts of the egg, and when poured out is ſeen to adhere a little to the internal layer of the membrane of the ſhell at the ſmall end of the egg.

The *yolk-bag* is ſtill flatter in its figure than before, and its contents are evidently more fluid than they were previous to incubation.

The *chalazæ* continue to approach each other below the poles of the yolk-bag.

The *amnios* is conſiderably increaſed, contains more fluid, and forms a deeper bed for the chick on the membrane of the yolk-bag.

The *veſicula umbilicalis* has made a rapid progreſs ſince the end of the third day. It now projects conſiderably beyond the fœtus. It appears flatter, and leſs full of fluid than at firſt; and at this period, by examination with a magnifying glaſs, a veſſel may be ſeen to ramify upon it.

Upon opening the yolk-bag, and waſhing off the yolk, the ſpongy coat is ſeen to be elevated in the courſe of the blood-veſſels of the vaſcular area: this is the firſt appearance of the valvular ſtructure of the yolk-bag, of which more hereafter.

The *fœtus* is ſtill more curved in its form, the prominence correſponding to the bill being bent down upon the breaſt. The rudiments of the upper extremities are apparent: they are two white buds or ſhort projections. The lower limbs are likewiſe produced, but without any more form. The cerebral veſicles are more eminent; and, when opened, their contents are found, though ſtill pellucid, to be mixed with ſome whitiſh fibres, which form opaque clouds, and are the commencement of the brain.

Haller found the *heart* beginning to undergo ſome changes about this period. The *auricle*, when viewed in the uſual manner on the right ſide of the fœtus, is ſeen to contain two ſemicircles. The moſt poſterior of theſe, or the one neareſt the vertebræ, is the largeſt, and terminates the auricle. The anterior ſemicircle is ſmaller, and divides the auricle as a kind of ſeptum. This is the firſt appearance of the diſtinction of the auricles into two. That which is to be called the left is the larger, and projects over the right poſteriorly. The latter, which is the ſmaller, has a ſemilunar termination, which is compriſed in the breadth of the left auricle. The vena cava and the auricular canal are inſerted in the interval of the two auricles.

The diſtinction of two auricles is likewiſe to be ſeen on viewing the heart on the left ſide. That which is to become the left is oval, wider than the other, and paſſes beyond the auricular canal.

At the end of the fourth day, or ſoon afterwards, the two auricles become more ſeparate from the vena cava and the auricular canal. They project over theſe veſſels, and are elevated from the two ſides of the baſe of the heart into a pointed top. The whole of the auricle, or the united reſervoir of the right and left auricles, appears then as a ſac with two pointed horns: each of theſe pointed tops has a ſeparate drop of blood. The border of both the auricles appears at this time notched. Mem. 2d ſur la Formation du Cœur dans le Poulet, &c. par M. de Haller, p. 70.

The *auricular canal*, towards the end of the fourth day, paſſes more in a direction from above downwards than formerly.

According to Maitre Jan, the rudiments of the *lungs* are viſible at this period; but Haller aſſerts that they do not appear before the 138th hour. The former author deſcribes at this time, in the neighbourhood of the heart, little reddiſh clouds, apparently of a ſpongy nature, which appear more or leſs red, alternately, as the heart moves, and which remain of an uniform colour when the heart has ceaſed to beat. Maitre Jan admits that the pulmonary veſſels cannot yet be diſcerned, but ſuppoſes from the above effect of the heart's motion, that they do exiſt, although they are not viſible. (Obſervat. ſur la Formation du Poulet, par Maitre Jan, p. 115 and 122.)—Not having examined this point, we cannot decide between theſe authorities, but we ſhould judge it improbable that the pulmonary veſſels could regularly tranſmit blood to the lungs, and yet not be viſible.

Both Haller and Maitre Jan agree that the *liver* makes its appearance towards the end of the fourth day. It is ſeen as a viſcous cloud of a reddiſh yellow colour, ſituated between the umbilical veſſels and the deſcending aorta. It is rendered more viſible and opaque by moiſtening it with diſtilled vinegar.

The *eye* of the fœtus appears black, the choroid coat being formed; and the ſuperior part of the eye chiefly preſenting itſelf to view, the pupil is ſituated in the inferior portion of the eye.

The end of the fifth day, or 120 *hours*, the *vaſcular area* is ſo much extended as to cover generally more than half the ſuperficies of the yolk-bag. The trunks of the veſſels are proportionally increaſed in ſize, but the branches near the circumference are not ſo much advanced. Some additional veſſels are ſeen to proceed from the umbilicus of the chick towards the left ſide of the area. Theſe appertain to the veſicula umbilicalis, as will be better underſtood hereafter. All the blood-veſſels of the area, which were in the firſt days of incubation of a fine ſcarlet, are now commonly found of a duſky red colour.

The *amnios* continues to increaſe in magnitude, and contains ſo much fluid, that the chick appears to be ſurrounded by a green liquor.

The *chick*, eſpecially when excited by a little external heat, can be perceived to move its limbs.

When the external membrane is removed, the *veſicula umbilicalis* is found to be conſiderably larger than it was the preceding day. It is likewiſe perceived to have contracted ſome adheſion with the external membrane, which however is undone by a ſlight force, particularly after the membranes have been a ſhort time immerſed in vinegar or ſpirits.

The branches of blood-veſſels which are diſtributed upon the veſicula, belong to a trunk that comes out through the opening of the abdomen at the umbilicus of the chick. The veſicula is connected with the fœtus by means of a neck, or contracted part, which is likewiſe received into the abdomen at the umbilicus.

Maitre Jan deſcribesat this period a number of fine branches of blood-veſſels upon the ſkin of the chick: we have not, however, obſerved theſe ſo early.

When the internal ſurface of the *yolk-bag* is examined, it is found that the eminences upon it, already mentioned, have aſſumed the form of veſſels ramifying from the centre, where the chick is ſituated, to the circumference of the vaſcular area. This appearance has been miſtaken by many of the older anatomiſts for real veſſels diſtributed upon the inner ſurface of the yolk-bag, and were ſuppoſed by ſome to be deſigned to convey the yolk to the chick. When the appearance of the yellow veſſels of the yolk-bag is firſt preſented, it is very difficult to detect the real occaſion of it, but as it advances, it becomes plain that the effect is produced by the inflection or doubling of the inner membrane of the yolk-bag, in the courſe of the real blood-veſſels of the bag. By a careful examination of the matter with a lens, even at this period, we have always perceived the appearance of yellow veſſels to ariſe from the blood-veſſels running in grooves, or reflections of the inner membrane. When the two tunics of the bag are ſeparated, the blood-veſſels are found to belong to the external, upon the inner ſide of which they appear as eminent lines; while upon the external ſide of the inner coat there are correſponding grooves or impreſſions.

The *heart* at this period begins to undergo the changes by which it approximates in ſtructure the heart of the adult bird. It becomes perpendicular, or in the line of the fœtus, from being placed in a tranſverſe direction. The point is recurved between the two lobes of the liver.

The *auricles* become more diſtinct, and the interval between them white.

The *auricular* canal is conſiderably ſhortened.

The *ſecond* or *right ventricle* begins to be formed before the termination of the fifth day. It appears as a little ſac under the bulb of the aorta. It is much ſhorter than the original ventricle, above which it is placed. Its figure is oval, and it has a red colour. In a ſhort time the new ventricle is ſeen in its proper ſituation, that is, on the right ſide of the heart. Haller ſtates that he found it placed on the right as early as the 117th hour. There are then two diſtinct drops of blood in this part of the heart of the fœtus, and a white line is perceived between them.

The *aorta* ariſes from the left ventricle. The branches, which are furniſhed in order to form the dorſal aorta, have an inclination downwards, and unite in an acute angle. At this period alſo the bulb of the aorta begins to diminiſh, and to retire into the fleſh of the heart.

The *liver* is more diſtinct than at the end of the preceding day; it is divided into lobes, and is of a pale or yellowiſh red colour. Its veſſels receive blood.

Haller firſt perceived the rectum at this period, although the ſtomach and other inteſtines were not yet formed. It appears in the ſhape of a trident, the lateral proceſſes of which are produced by the rudiments of the two cœca.

The End of the 6th Day, or 144 *Hours.*—Eggs placed ſo long under the hen are conſiderably diminiſhed in weight, which is even perceivable on taking them into the hand. The ſhell begins to appear more dry, and opaque coloured, and is more fragile than before incubation.

The diminution of weight depends upon the enlargement of the air-cell, which now extends over a conſiderable part of the great end of the egg. Maitre Jan has taken ſome pains to prove that the air contained in the egg is not derived from the atmoſphere. He ſuppoſed that the fluids filtered through the inner layer of the membrane which lines the ſhell, and that by the action of heat, they were volatilized or converted into air. This opinion is not only improbable, but refuted by particular facts. On opening the air-cell, we do not find its ſurface to poſſeſs any moiſture; that layer of the membrane which lies next the humours of the egg, although leſs thick, is ſmoother, denſer, and leſs porous than the layer immediately in contact with the ſhell, and therefore leſs fitted to admit the tranſpiration of either fluids or air. The chemical properties of the gaſeous contents of the air-cell ſeem to put it beyond all doubt that the atmoſpheric air paſſes into the egg. (See the article Egg.) We ſhall only add, that when we have varniſhed the external ſurface of the ſhell the air-cell no longer increaſed in ſize.

Upon opening an egg at this period of incubation, it is not unuſual to ſee the chick turned upon its back, inſtead of lying, as before, upon its left ſide. This circumſtance ſeems to depend upon the amnios having ſo much increaſed in ſize that the fœtus may roll round within it.

The membranes around the chick begin to acquire more ſtrength and firmneſs, which is the conſequence of the veſicula umbilicalis becoming more cloſely and extenſively united to the external membrane.

The *veſicula* is now found to be very much increaſed in magnitude, and to cover a conſiderable portion of the yolk-bag. When the membranes ſurrounding it are cut open, and the veſicle expoſed, its neck or peduncle may be traced as a fine tranſparent tube to the rectum, by a careful examination, particularly if the parts have been rendered opaque, by being a ſhort time ſteeped in vinegar or ſtrong ſpirits. Where it opens into the rectum it is dilated.

The connection that exiſts between the veſicula umbilicalis, and the end of the rectum, by means of a tube analogous to the urachus, has induced Haller and others to conſider this bag as the reſervoir of urine.

We ſhall find in the ſubſequent periods of incubation, that the veſicula umbilicalis performs very important and other functions than thoſe of a reſervoir of urine, in which, nevertheleſs, it does not perhaps materially differ from the allantois of quadrupeds.

It is neceſſary here to notice an error which two of the beſt writers upon the ſubject of incubation have fallen into with reſpect to the veſicula umbilicalis. Both Malpighi and Maitre Jan ſuppoſed it to be a part which afterwards became the ſtomach of the chick. This miſtake appears to have been occaſioned by the veſicula becoming, as we ſhall afterwards deſcribe, ſo much extended as to loſe the figure of a bag, and from being united to other membranes, only to be diſtinguiſhed with difficulty. Its being viſible nearly three days before the ſtomach; acquiring even then a much greater ſize than that viſcus poſſeſſes, and differing eſſentially in figure and texture, ſhould however have prevented theſe two parts from being confounded with each other.

The *chick*, on the ſixth day, has aſſumed a good deal of its natural form. The extremities are ſo much developed, that the diviſions of theſe members are viſible. The wings have their bent figure, and the legs are added to the thighs.

This period is likewiſe marked by the firſt appearance of moſt of the important organs of the body, beſides ſome changes in thoſe already formed.

Haller ſtates that he could diſcern the *pericardium* at this time.

The two *auricles* are ſtill more diſtinct than at the end of the preceding day.

The *auricular canal*, which had before begun to retire within the fleſh of the heart, is now not viſible.

The *ventricles* are better formed, and broad at their baſe.

The *bulb*, the *ſtrait*, and the *beak* of the aorta, which gave origin, in the early periods, to the principal arterial trunk, are in general not apparent at the end of the ſixth day. This veſſel is ſeen to come forth from the baſis of the heart itſelf.

The *pulmonary* artery was ſeen by Haller firſt, about the middle of the ſixth day. This veſſel is leſs firm and opaque than the aorta; it ariſes from the left ſide of the baſis of the heart with a little bulb. It is uſually of leſs diameter than the aorta. Almoſt at its exit from the heart it divides into two branches.

The branch on the left ſide forms an arch, in order to reach the lung of that ſide in paſſing behind the bronchia: it joins the aorta, towards the third vertebra of the back. The branch of the pulmonary artery, which is inſerted into the dorſal aorta, is longer than the *ductus arterioſus* of quadrupeds, to which it is analogous. It ſhould, however, receive the name of *left*, as birds have a ſimilar arterial duct upon the right ſide. The left lung receives a conſiderable branch from the ductus while on its way to join the aorta.

The other principal branch of the pulmonary artery paſſes tranſverſely to the right ſide, under the aorta; to which it adheres. It furniſhes the artery to the right lung, and deſcends behind the bronchia, in order to open into the aorta, higher than the left branch already mentioned. The right arterial duct is much ſmaller than the left.

Theſe arterial ducts are two of the three branches, which have been deſcribed in the preceding days as contributing to form the dorſal aorta. The right duct is later in appearing than the other, and hence, when the aorta is firſt diſcovered, it is obſerved to be only formed by two branches.

About this period the *lungs* have ſufficient conſiſtence to be viſible. When they are rendered opaque by vinegar, they are found to be not ſo ſmall, that they might not have been ſeen ſome time before if their tranſparency had permitted it. Their figure is cylindric. They are attached poſteriorly to the back, and connected with the two ſides of the heart.

The *liver* has acquired more of its future form than it had the preceding day.

The *ſtomach* is apparent at this time. It is very thin and tender, and reſembles a good deal the form of the human ſtomach; its orifices are, however, nearer to each other. The ſtomach is received between the lobes of the liver.

The fluid contained in the *cerebral veſicles* has acquired by this time ſome conſiſtence.

The *kidnies* are diſcovered during this day as long reddiſh granulated lines or traces in the loins.

The End of the 7th Day, or 168 *Hours*.—Upon opening an egg at this period, we perceive that the changes already mentioned in the form, conſiſtence, and ſituation of the humours have continued to increaſe.

The *white* tends more towards the lower part and ſmall end of the egg: it continues to diminiſh, and to become more tenacious in its compoſition.

The *yolk* is more fluid, more ſpread out, and apparently of a larger ſize than before. Haller nevertheleſs found it at this date to poſſeſs its original weight.

The *blood-veſſels* which are diſtributed upon the membranes, and which were in the firſt days, as before mentioned, of a brilliant ſcarlet, are now in moſt eggs found to be all of the purple or venous colour. The uniformity of colour makes it difficult to diſtinguiſh the arteries: they can indeed be only aſcertained by diſſecting the membranes and purſuing the courſe of the veſſels into the body of the chick.

The *amnios* is ſtill larger at this than any previous period; it preſerves its kidney form, and its fluid is tranſparent, and cannot be rendered opaque, or coagulated by vinegar or ſpirits.

The *veſicula umbilicalis* goes on increaſing in ſize, and its veſſels acquire ſtrength.

The *chick* has its members more developed. The *feet* are added to the poſterior extremities, and even the *toes* can be diſcerned. Oſſification has commenced. Haller ſtates that he prepared the *femur* and *tibia* at the 146th hour. The *two mandibles* begin to form at the under part of the head, leaving an aperture between them, which is to be the mouth.

Haller at this period obſerved the firſt convolutions of the *ſmall inteſtines*, which were ſo extremely tender as not to admit of being touched, although the rectum was apparent two days before.

The *ſpleen* now firſt makes its appearance. Haller ſuppoſed that he could likewiſe diſcern the *renal capſules* and *ovaries*.

The intermediate of the three veſſels which ariſe from the heart to form the dorſal aorta, is, about this time, ſeen to furniſh the *two carotids*; it is the ſame veſſel which becomes the *deſcending aorta*, when the ſtructure of the pulmonary artery is completed. Haller ſtates that the pulſation of the aorta ceaſes after the 154th hour.

The *eye* of the fœtus is conſiderably developed at the preſent period. The three humours exiſt: the *vitreous* is extremely abundant, upon which depends the great bulk of the eyes of the chick about this time. The *lens* is ſmall. The *iris* is formed, but is very tranſparent. The trunks of the *optic nerves* and *retina* are viſible. The latter is tranſparent and plaited, and ſeems to go as far as the lens. The radiated black lines which form the *corona ciliaris* are ſeen through the retina, placed around the external part of the lens.

The End of the 8th Day, or 192 Hours.—The *vaſcular area* has increaſed ſo much by this time, that it very nearly covers all the ſuperficies of the yolk-bag, except what is in contact with the white. The branches of veſſels, however, begin to decline or diſappear in ſome parts, particularly towards the circumference, although the trunks are larger than at any former period.

The blood-veſſels belonging to the veſicula umbilicalis are conſiderably enlarged and extended, and are now ſeen to turn backwards, or be reflected upon themſelves in the direction of the chick. The reflected portion of the veſſels of the veſicula appears to be diſtributed to the ſuperior half of that bag which is now in contact with the external membrane. This membrane, which was in the firſt periods of incubation, as already mentioned, perfectly tranſparent, by its connection with the veſicula becomes vaſcular, and acquires ſtrength, and contributes to form a complete ſac, which envelopes in the latter days all the humours and the chick, as will be hereafter deſcribed.

The veſicula umbilicalis is found at the preſent period to have a conſiderable extent, according to our obſervations much greater than has been repreſented by anatomiſts in general, who do not ſeem to have been acquainted with the uſes of this bag in the later ſtages of incubation.

The *chick* is a very pale pink colour, or white ſlightly tinged with red, in conſequence of the vaſcularity of the ſurface preparatory to the formation of the ſkin and feathers.

When the *head* of the *chick* is viewed poſteriorly, it preſents the appearances of four eminences, which are an opaque white, and are joined to each other by tranſparent membranes. Maitre Jan conſiders them as the rudiments of the bones of the cranium in a cartilaginous ſtate, and the tranſparent parts as correſponding to the ſutures and fontanel. Haller ſpeaks of theſe eminences as four lobes of the brain. We conceive the account of Maitre Jan to be more correct.

The head being opened at this period by Maitre Jan, he ſtates that he diſtinguiſhed the *membranes*, the *ſinuſes*, and the *veſſels* of the brain, and that the ſubſtance of the *cerebrum* and *cerebellum* was well formed, the *convolutions* even being apparent. This obſervation, according to our experience, is premature.

The ſtructure of the *eye* is more perfect than before. The *ciliary zone*, according to Haller, is as perfect at the preſent period as at any time afterwards. Its deſcription, however, is eaſier ſome days later.

The *bill* of the chick is cartilaginous. The animal occaſionally opens it in the water of the amnios as if attempting to ſwallow.

The breaſt of the fœtus, which was covered by a thin membrane, that in the firſt days was ſo tranſparent, as to give riſe to the miſtake of the heart being outſide the cheſt, has at the preſent time ſome fleſh upon it. About this period alſo the rudiments of the *ſternum* and of the *ribs* may be diſcovered.

The *gall-bladder* makes its firſt appearance towards the end of the eighth day, at which period, and for a few days afterwards, it is very ſmall and without colour.

About this time the reflections of the inner tunic of the yolk-bag, which we have deſcribed at the end of the fifth day, as putting on the appearance of yellow veſſels, acquire more decidedly the form of valves. They ſtill preſerve the ſame ſituation and courſe, commencing under the bed of the fœtus, and extending outwards in a radiated manner towards the circumference of the vaſcular area, where they terminate. They are made of a number of plaits or folds which have a tranſverſe direction, and which are more prominent, or have deeper folds in proportion as the valvular lines approach the circumference of the circle. They form merely waves where they commence, and at the preſent period they are on every part of the yolk-bag much leſs marked and ſtriking than they become towards the end of incubation.

The End of the 9th Day, or 216 Hours.—Maitre Jan mentions the appearance of ſome new parts at this period which we have not met with ſo early. He deſcribes the *kidnies* as ſecreting a milky fluid, which he ſaw diſtending the *ureters*. He diſcovered about this time the *crop* and the *trachea* and was not only able to diſtinguiſh the principal diviſions of the *brain*, but ſtates that he could diſcern the *ventricles* with the *eminences* they contained, and even the *plexus choroides*. He likewiſe ſaw upon the baſis of the brain the greater number of the *nerves* that ariſe there, more particularly the *optic* and *auditory* nerves, and found the *ſpinal marrow* to be ſplit or compoſed of two parts at its origin. He diſſected the nerves of the ſpinal marrow, which, although very ſmall, he ſtates to be much more firm than thoſe which take their origin from the brain. Obſerv. ſur la Formation de Poulet, p. 189.

The ſurface of the fœtus exhibits now a number of pores; theſe are principally ſituated upon the thighs, the back, the neck, and the wings, and are the apertures of the cells in which the *feathers* are formed.

The *eyes* are larger than the veſicles of the brain; their form is not ſpherical, but flattened upon the anterior and poſterior ſides.

The *iris* is ſtill thin and tranſparent; but there are ſeen through it and the tranſparent cornea five or ſix white points which form a circle. When the eye is opened carefully with a lancet, theſe points are found to be elongated, and to form little lines, or ciliary fibres, which at this period are white.

Maitre Jan ſtates the *eyelids* to be formed at this time, but to be ſo tranſparent as to be inviſible, unleſs after preparation by a ſtrong acid.

The *inteſtines* are now ſo firm, that they can be examined without danger of breaking them.

The *yolk-bag*, according to Maitre Jan, begins to form two lobes, a larger and a ſmaller; but we have not obſerved this change to take place before the 11th or 12th day.

Maitre Jan made the experiment of boiling an egg at this period, after having fixed it upon a plate of lead with its ſmall end downwards. When deſpoiled of the ſhell, and the chick removed, the depreſſion in which the amnios lay was fully expoſed, and found to be very conſiderable. He then made a ſection of the egg in the vertical direction, dividing the depreſſion of the yolk through the middle, when there appeared a round ſpace about the eighth of an inch in diameter, filled with a whitiſh curdy matter, and another ſpace around this of a larger extent, containing a firmer matter than the firſt, and of a paler yellow than the reſt of the yolk. Maitre Jan, very erroneouſly in our opinion, ſuppoſed the white curdy ſubſtance to be the inteſtines of the fœtal chick. Theſe do not project from the abdomen in ſufficient quantity to account for the appearance, admitting that they had been ſeparated from the chick, and had adhered to the yolk during the boiling of the egg. This appearance, we believe, ariſes from the ſame change of organization in the yolk being continued, which in the early periods of incubation produced the whitiſh appearance under and around the bed of the chick. The firm, pale yellow texture of the yolk which encompaſſes that juſt mentioned, Maitre Jan accounts for by ſuppoſing that the fluid parts of the yolk in the neighbourhood of the chick had paſſed into the amnios. There can be no doubt that different parts of the ſubſtance of the yolk are differently conſtituted, which difference is preſerved notwithſtanding the motions that eggs may experience; a fact that cannot perhaps be fully explained, but which proves that animal fluids have their peculiar organization, which they can maintain as well as the ſolids. When the fluids change this compoſition, it is often by ſome vital action in themſelves, inſtead of a fermentative proceſs, or the mechanical operation of the ſolids upon them, as is commonly ſuppoſed.

In making the experiment of boiling eggs at this period, Maitre Jan did not find that the amnios was coagulated, although Haller ſtated that the liquid of the amnios is coagulable at the 198th hour.

The *valvular ſtructure* upon the internal ſurface of the *yolk-bag* is more prominent, and when minutely examined, it is found to receive branches of the blood-veſſels which are given off at right angles with the plane of the ſurface of the bag, and having penetrated towards the edge of each valve, there unite and form a ſingle veſſel, which runs within that edge. This ſtructure is better ſeen a few days afterwards.

The End of the 10*th Day, or* 240 *Hours.*—The *veſicula umbilicalis* has now a very conſiderable extent, occupying the greateſt part of the ſurface of the vaſcular area, which laſt is ſpread over almoſt the whole of the yolk-bag. The portion of the bag that is applied to the white, is not at this date the ¼th of the whole. The chalazœ, therefore, are much nearer to each other than when we laſt mentioned them. The white is confined almoſt entirely to the lower part of the egg, and its maſs continues daily to diminiſh, while, on the contrary, the bulk and quantity of the yolk appears to be increaſed.

The *external membrane* is firm and fleſhy where it is ſtrengthened by the veſicula umbilicalis. Some of its veſſels are ſeen to extend to the white, upon which a fine pellicle may be obſerved to grow, and which is the firſt appearance of a membrane to this humour, notwithſtanding ſome authors ſpeak of the *membrana albuminis* as an original ſtructure, and others, amongſt whom is Blumenbach, deſcribe the membrane which lines the ſhell as belonging to the white.

The *amnios* is larger, its membrane more firm, and the fluid leſs clear and limpid than before. It has contracted ſome adheſions with the veſicula umbilicalis, and by that means, with the external membrane. Theſe adheſions are particularly in the courſe of the blood-veſſels, that are diſtributed to the veſicula and external membrane. One of theſe veſſels is always ſeen to paſs acroſs the back of the chick, at which place it is involved in a reflection of very fine membrane, which is connected with that of the amnios.

The *chick* is very much curved at this period: its beak is uſually doubled down between its feet. The *feathers* are apparent.

The external form of the *head* bears a greater reſemblance to that of the full-grown bird, except that the eyes are ſtill enormouſly large.

The *eyelids* are evidently formed, and are occaſionally moved by the chick. The *membrana nictitans* is likewiſe to be ſeen.

Haller prepared at this period the *ciliary zone* and radiated appearance called the *crown*, with the membrane on which the latter is ſuſtained, although he ſtates that theſe parts are formed on the 8th day, or before it.

He ſays he has ſeen on the 7th day the corona ciliaris, or corpus ciliare of Morgagni. At this epoch the retina, which is in thick folds, appears to go as far forwards as the cryſtalline lens, behind the corona ciliaris, with which it is covered, and which is dimly ſeen acroſs it. He believes, notwithſtanding, that the retina does not proceed to the lens; that the appearance of its doing ſo ariſes from its thickneſs and folds leaving ſo ſmall a ſpace between it and the lens, and that the membrane which ſupports the ciliary zone and crown, and is attached to the cryſtalline, is different from the retina.

The corona ciliaris is a row of black lines arranged alternately, long and ſhort, in ſome degree parallel, but converging as rays proceeding from the external circumference of the uvea to the cryſtalline lens. The ciliary crown is not formed entirely in the ſame manner in quadrupeds and birds. In the former it appears, when examined by a microſcope, to be compoſed of a plicated membrane, upon which ſome ramified veſſels advance towards the cryſtalline. In birds there are only ſome ſerpentine lines folded upon themſelves, which are very numerous in the contour of the ciliary crown, and of which many unite to form ſingle ones: they are joined together by theſe branches, and are covered with a black pigment.

The figure of the ciliary zone and crown is not a perfect circle, but it is broader on one ſide than the other.

The greater number of anatomiſts have deſcribed the corona ciliaris as reſting immediately upon the membrane of the vitreous humour. Others have believed that the retina extends to the cryſtalline, and that the corona is ſupported upon it. Since Zinn's publication upon the anatomy of the eye, the ſtructure of the ciliary body in man and quadrupeds has been well underſtood; but in birds the lamina, which ſerves for the baſe of the corona ciliaris, does not come from the membrane of the vitreous humour.

The membrane, which is placed under the corona ciliaris in birds, is to be ſeen from the 8th day. It is radiated, opaque, and a little aſh-coloured; more thin than the retina, and thicker than the membrane of the vitreous humour. It is of the ſame dimenſions as the corona ciliaris, and in a degree attached to the corona, and much more firmly united in the latter days of incubation; and after the excluſion of the chick, it adheres by its poſterior extremity to the great circle of the retina, and by the other to the cryſtalline lens.

The retina terminates by a diſtinctly formed circle, which is a little ſtrengthened at the circumference of the corona ciliaris, and at that of the zone. The plane of the retina is continued with that of the corona; the zone is placed more poſteriorly than the retina. Its external part, which reſts upon the vitreous humour, is nearly horizontal, and its internal part becomes ſtraight again in order to be attached to the cryſtalline lens. It does not adhere to the membrane of the vitreous humour when the chick is but little advanced. It remains often placed upon that membrane without being attached to it, and when the chick is more formed, or after incubation is finiſhed, it quits the membrane of the vitreous humour, in order to remain connected to the corona ciliaris, with which it becomes inſeparably united in the end.

The circumference of the ciliary zone, in the latter days of incubation, can be ſeparated from the membrane of the vitreous humour without leaving any ſhreds. It is diſtinguiſhed from the retina by its fineneſs and being ſeparable from the latter without being torn; but it is continued with the poſterior and inferior part of that membrane. It differs ſtill more from the membrane of the vitreous humour; it is thicker, it has more brown and leſs blue in its colour. Acids, when applied to it, affect its colour more than they do that of the vitreous membrane. It is ſituated anteriorly upon that membrane, in another plane, and evidently ſuſtained by it, and conſequently ought not to be confounded with it.

The canal of Petit does not exiſt. The membrane of the vitreous humour proceeds, without ſtopping behind the ciliary zone to be attached to the cryſtalline lens, that it ſuſtains, and which remains in its place even when the corona ciliaris has been raiſed.

The ciliary zone is eaſy to prepare even in the chick but little advanced. One method is to cut off the cornea and iris; and having waſhed away the black pigment with which the corona ciliaris is covered, it will appear between the intervals of the ciliary rays; and if ſome of thoſe rays be elevated, it will be ſeen in its proper place. It is practicable to make the lens come forth from its depreſſion, and to elevate it with the corona ciliaris, with which it is connected; and ſometimes it may be poſſible to leave the zone reſting upon the membrane of the vitreous humour.

An eaſier mode of preparation is to cut the ſclerotic coat through the middle, and to plunge the anterior half of the eye into vinegar. After ſome hours immerſion in that fluid, if the back of a fine ſcalpel be inſinuated between the retina and the choroid coat, and the vitreous and cryſtalline humours be removed, one ſometimes ſucceeds in obtaining the ciliary zone alone, the corona remaining attached to the choroid. It is rare to have the zone entire, but a conſiderable part of it is commonly preſerved, and particularly the whole of the external circle. When the experiment fails, it is the interior circle which remains attached to the corona.

In the above account of the ciliary zone and crown, we have anticipated many facts that are obſervable during the laſt days of incubation, and even after that proceſs terminates, in order to render the hiſtory of thoſe parts more intelligible. We have alſo been induced to borrow the preceding deſcription from Haller, who made the ſtructure of the ciliary zone and crown in the chick a particular ſubject of inveſtigation, as we have not much attended to the progreſs of the eye during incubation. See Mem. ſur la Format. du Cœur dans le Poulet, ſur l'Œil, &c. Obſerv. 180, 181, 182, 191, 192, 193, 215, 216, 226, 228, 231, 239, 240, 247, 249, 253, 254, 256, 261, 262, &c. and ſect. xii. Mem. ſecond par M. Haller. The *ſmall tubercle*, from whence the aorta and pulmonary arteries ariſe, and which appears to have been a remnant of the bulb of the aorta, entirely diſappears about the preſent period.

The *right ventricle* of the heart is ſtill about the one-fourth of its length ſhorter than the left.

Thoſe *bones* of the chick, according to Haller's obſervations, which are now formed, are merely in a cartilaginous ſtate; even the *cranium*, which was apparent ſome time before the preſent.

The *umbilical opening*, through which the urachus and the blood-veſſels communicate with the interior of the body of the chick, forms a projection, or a ſort of tube, which in a few days becomes more ſtriking. Some of the convolutions of the inteſtines may be ſeen in this opening, but the greateſt part of the inteſtines is contained in the body of the fœtus.

The end of the 11*th day, or* 264 *hours*, the *external membrane* goes on ſtrengthening, by its connection with the *veſicula umbilicalis*. This laſt is now ſo extenſively united to the external membrane and the amnios, that it is only by great care, and after being macerated in ſpirits, that it can be liberated from its connections, and expoſed as a diſtinct bag, pendent from the umbilicus. When thus ſeparated by diſſection, it is ſeen to be a large ſac, compoſed of a thick fleſhy membrane and hardly containing any fluid. The ſtrength of the bag appears to depend upon a reflection of ſome of the other membranes covering and being inſeparably adherent to it, for at the umbilicus the veſicula is thin. Haller traced the urachus from the veſicula to the rectum after the preſent period, and even until the laſt day of incubation; but in our obſervations it has appeared that the connection of the veſicula with the chick, except by means of the blood-veſſels, after this time, is very obſcure.

The whole of the body of the chick is now ſeen to be covered with *feathers*.

Haller at this period firſt diſcovered the *tongue*.

The ſubſtance of the *brain* is ſtill found to be a very ſoft pulp.

The *liver*, in moſt inſtances, has a yellow colour, but in ſome the red predominates.

Bile is evidently ſecreted: the *gall-bag* is green, and a greeniſh or yellow fluid is commonly found in the ſtomach. The inteſtines likewiſe appear to contain bile, or at leaſt a bitter fluid.

The *renal capſules* are evident; they have, according to Haller, the form of an S.

The tube or ſheath which projects at the umbilicus is better formed.

The *blood-veſſels*, which come out at this place, are eaſily traced from different ſources. Thoſe which are diſtributed to the external membrane and veſicula come from the loins, and thoſe belonging to the yolk-bag are from the abdomen.

The end of the 12*th day, or* 288 *hours*, the *chick* has more of the figure of the adult bird than at any preceding period. The extremities are larger, and the head ſmaller, in proportion to the reſt of the body. The bill is more pointed, and of a harder ſubſtance.

The *ſtomach* has gained greater ſtrength; it contains a white coagulated or curd-like ſubſtance.

There is *bile* found in all the inteſtines, which is very bitter.

On the outſide of the umbilical ſheath there are ſome folds of the inteſtines, with one of which the yolk-bag is ſeen to be connected by a ſhort proceſs, which is evidently the continuation of the alimentary canal into the yolk-bag. This part has commonly, and as we ſhall hereafter ſee very deſervedly, received the name of *ductus vitello-inteſtinalis*. Although we have not obſerved the duct before the preſent date, there is every reaſon to ſuppoſe that it is coeval with the inteſtines.

Malpighi ſtates that he ſaw the *ſtomach* of the chick on the outſide of the umbilical ſheath: but this would ſeem to be an error. The ſtomach, it is true, is ſituated low down in the belly, but, as far as our obſervation goes, it never is protruded from that cavity.

The ſtructure of the *eye* is the ſame that is deſcribed on the 11th day. It is proper to remark, that at no period is there to be found in the chick a *membrana pupillaris*.

The *yolk-bag*, according to our obſervations, begins in general to alter its figure. Before this date it was an irregularly round maſs, containing two depreſſions; one for accommodating the chick and amnios at the upper ſide, and another at the lower part of the yolk, in which the white is partially lodged. The latter is a regular depreſſion, and before this period contracts in breadth, although it becomes ſomewhat greater in depth; an alteration which ariſes from the diminution of the white, and from the chalazæ tending to approach each other, and thereby to bring the two poles of the yolk, at which theſe bodies were originally attached, together on the lower ſurface of the yolk. The approximation of the chalazæ ſeems likewiſe to occaſion, in the firſt inſtance, the diviſion of the yolk-bag into lobes. At the preſent period the bag forms two lobes, one large and one ſmall. Theſe afterwards, by the compreſſion of the chick, are uſually moulded into three, but in the egg of ſome other birds into a greater number: thus the yolk-bag in the *Guinea fowl* is divided into ſix or ſeven lobes.

The End of the 13th Day, or 312 Hours.—Upon opening an egg at this period, and removing the contents from the ſhell, the *white* is found to have aſſumed a greeniſh hue, and to have more conſiſtence than at any of the former periods; and it is incloſed entirely by a fine film, which retains it in one poſition, and in ſtrict connection with the depreſſion on the inferior ſurface of the yolk-bag. The external veſſels are diſtributed over the whole white.

The *yolk-bag* has ſtill more of the lobulated figure, and the chick lies obliquely acroſs the bag in the ſuperior depreſſion between the two lobes.

The *valvular* ſtructure on the internal ſurface of the yolk-bag, which we have noticed before, has now arrived at perfection. The valves are more eminent, form numerous folds or coils, their edges appear to be covered by tubes which are convoluted upon themſelves in the manner of inteſtines. Theſe have been called by Haller the *vermiform* and *inteſtiniform tubes*, and have been deſcribed both by him and other anatomiſts as real veſſels: but they have always appeared, in our examinations, as reflections or proceſſes of the valvular ſtructure, in the ſubſtance of which the real blood-veſſels ramify. Maitre Jan ſpeaks of them as veſſels which collect the fluid of the yolk, and which afterwards terminate in the blood-veſſels. Haller conſiders the blood-veſſels which run in the edge of the valves as a diſtinct order of veſſels, that end in the trunks of the veins of the yolk-bag, and which take their origin at the circle, that exiſts in the latter days of incubation around the line where the yolk and white are joined to each other. We have already ſaid that the veſſels upon the edges of the valves have numerous communications with thoſe that run along the roots or baſes of the valves, and which belong to the external tunic of the yolk-bag, and were originally the ſame veſſels that formed the vaſcular area. The venous circle of the yolk-bag, we have no doubt, is the ſame that in the early ſtages of incubation has been deſcribed as the contour of the vaſcular area: and the vermiform tubes appear to be the villous or ſpongy proceſſes of the external ſurface of the yolk-bag, which appeared in the firſt days greatly extended, and grown into the form now deſcribed.

The *chick*, at the preſent period, has ſtill more of its perfect form; its head is much curved, and the bill is placed under the wing, which poſition is preſerved throughout incubation.

The *bill* is pointed and has its natural figure. Haller ſtates, that the chick is often perceived to open and ſhut the bill about this period and afterwards. Maitre Jan, on the contrary, although the chick moves its limbs frequently and ſtrongly, aſſerts, that it does not open its mouth. We have not attended to this circumſtance, from conſidering it of little conſequence, and no way explaining the mode in which the chick is nouriſhed.

The *internal organs* of the *chick* are conſiderably advanced towards perfection. The *brain*, although ſtill ſoft and pulpy, is well formed. The *kidnies* and *teſtes* are completed in their figure. The *ſpleen* reſembles a conglobate gland. The *lungs* are of greater ſize than the heart.

The firſt branch that the aorta gives after its exit from the heart is the *left carotid*, which gives off the *ſubclavian artery* of that ſide. The trunk of the aorta then forms an arch, which turns to the right. It ſends off the *right carotid*, and approaches the vertebræ in paſſing behind the right lung: it is united to the ductus arterioſus above the liver.

The right ventricle of the heart is ſtill ſhorter than the left; it is of an oval figure, but the latter ends in a point.

The end of the 14th day, or 336 hours, the changes in the humours and the formation of the organs of the chick are found to have made progreſs ſince the preceding day.

We have already ſtated that the membrane which is external to the chick and the yolk-bag, and which is ſcarcely palpable in the firſt days of incubation, gains ſtrength and receives veſſels after the veſicula umbilicalis has acquired ſome ſize, and has adhered to it. The magnitude of the veſſels, and the thickneſs of this membrane, increaſe in proportion as the veſicula umbilicalis grows: we therefore conceive that the developement of this membrane depends upon its connection with the veſicula and the blood-veſſels which it derives from that bag. We have obſerved, that ſome days before the preſent period, the external membrane begins to extend over the white, which it uſually encloſes about the 14th day: it therefore forms a perfect ſac, containing the chick in its amnios, the yolk-bag, and the white.

The veſicula umbilicalis about this period has arrived at a very great ſize; its extent cannot be eaſily aſcertained, as it is ſo much incorporated with the external membrane, that they cannot be ſeparated or accurately diſtinguiſhed: but we ſhould conceive that the veſicula exceeds in ſize the yolk-bag, as there is the appearance of the external membrane being thickened and ſtrengthened by one under it as far as the yolk extends.

The manner in which the veſicula concurs to form a membrane which inveſts all the contents of the egg, appears to be ſimilar to the reflection of the ſerous membranes of the thorax and abdomen, in order to cover the viſcera and line the parietes of theſe cavities. It ſhould however be obſerved, that when it is opened, there is no appearance of its forming an immediate tunic ſimilar to the pleura pulmonalis, but it ſeems to be a ſimple bag, holding the contents of the egg, and only united to them by ſome reflections of very fine membrane, which are chiefly attached to the back of the amnios, and in the courſe of the trunks of the blood-veſſels. This circumſtance has embarraſſed other obſervers, and has led many to overlook the ſhare that the veſicula umbilicalis has in the formation of the common membrane of the parts of the egg.

The *blood-veſſels* which are diſtributed to the external membrane are, even at the preſent period, much larger than thoſe of the yolk-bag. There are four long branches, which ſend out numerous ramifications, that become ſo minute as to evade the ſight; but when this membrane is viewed with a magnifying glaſs, it preſents a beautiful ſpectacle. The ſituation of the four great branches is not conſtantly the ſame; as they are diſperſed upon a looſe membrane, which varies in ſome degree its poſition according to circumſtances: one of them, if not two, is always ſeen, however, to croſs the back of the amnios. The four branches are arteries, and are formed immediately on the outſide of the umbilicus of the chick from the two iliac arteries; they, therefore, correſpond to the *umbilical arteries* of mammiferous animals. The left iliac artery is always of much greater ſize than the right; it even appears larger than the aorta, of which it is the termination.

nation. The right iliac artery is often a mere filament, and in ſome inſtances it ſeems to be wanting altogether.

The *venous branches* which accompany the umbilical arteries are ſo ſmall that they are hardly diſtinguiſhable, although the former are of ſufficient magnitude to be injected, and have a viſible pulſation. There is, therefore, a quantity of blood ſent to this membrane which is not returned to the fœtus. The colour of the blood, both in the umbilical arteries and veins, is a purple.

The vaſcular membrane, above deſcribed, has received different names. By the older anatomiſts it was uſually called the *chorion*, to which perhaps it is moſt analogous. Haller gave it the name of the *umbilical membrane*, and Leveille has lately called it the *bag-ſhaped membrane* (*membrane ſacciforme*), from the circumſtance of its enveloping all the parts of the egg. We have hitherto called it the *external membrane*, until it ſhould be deſcribed; but hereafter we ſhall ſpeak of it as the *chorion*. In the account of the unincubated egg, the membrane, on which the ſhell is moulded, is called the external, which it ſtrictly is. It ſhould not be confounded with the chorion, from which it differs ſo much in figure, ſtructure, and uſe. See Egg.

Haller appears to have not diſtinguiſhed the chorion from the membrane of the yolk-bag, which contains the vaſcular area. The progreſs of theſe two membranes is exceedingly different, and the ſyſtem of veſſels belonging to each is perfectly diſtinct. The valvular area is confined to the ſurface of the yolk-bag, and is intimately connected with its membranes, and the valvular apparatus already deſcribed. The veſſels of the area are chiefly venous, and are formed independently of the heart of the chick. They are moſt numerous in the early periods of incubation, although they increaſe in ſize along with the other parts of the chick. They go to terminate in a large vein which proceeds directly to the auricle of the heart in the firſt days, but, after the liver appears, is ſeen to paſs behind it, and when the inteſtines are formed is found upon the meſentery, and conſtitutes the largeſt branch of the vena portæ.

The arteries of the vaſcular area are inſignificant, until towards the end of incubation. When firſt perceived, they are given off from the dorſal aorta, and after the developement of the inteſtines they are diſcovered to be branches of the meſenteric artery. The veſſels diſtributed to the area appear, therefore, analogous to the omphalo-meſenteric arteries of quadrupeds, although their deſtination and functions may differ.

The *veſſels* of the *chorion*, as we have already ſaid, are branches, or rather, in the fœtal ſtate, the trunks of the iliacs extended upon this membrane. They do not exiſt previous to the appearance of the veſicula umbilicalis, with the growth of which they keep pace. The arteries of the chorion exceed the ſize of its veins in the ſame proportion as the veins of the yolk-bag exceed the arteries of that part. The vaſcular area, therefore, collects and tranſmits the blood to the fœtus, while the arteries of the chorion diſpoſe of a great portion of it in an extraneous circulation, and in the formation of a thick and extenſive membrane.

Haller and others have deſcribed, at this date, an appearance of white veſſels upon the albumen. Maitre Jan reckons ſeven of theſe white lines or veſſels. They ariſe from a little circle which is in the centre of the white; they divide into branches in advancing towards the vaſcular circle of the yolk-bag, which forms at this time the boundary of the ſeptum between the yolk and the white. Maitre Jan deſcribes them as paſſing beyond the ſeptum and extending to the yolk. Haller conjectures that the uſe of theſe veſſels may be to abſorb the white and convey it into the yolk. Obſerv. 226. Mem. 1.

We have not made ſuch an examination of theſe white lines, as to enable us to pronounce whether they are veſſels or not, or what their uſe may be.

The *water* of the *amnios* appears to diminiſh about this period of incubation. It alſo becomes gradually leſs pure. It is ſtated by Maitre Jan, that when the fluid of the amnios is boiled at this date, the greater portion of it acquires the hardneſs that the white of the egg poſſeſſes after being boiled, although previous to the experiment it is much more fluid than the albumen; from whence Maitre Jan conjectures that ſome of the fluid of the white is conveyed into the ſac of the amnios, but he does not pretend to explain the means by which this is effected.

The *curd-like ſubſtance*, already mentioned as being found in the ſtomach and inteſtines, is now met with alſo in the crop and œſophagus. According to Haller, boiling water makes this ſubſtance hard in the ſame manner as it does the white of an egg.

The end of 15 days, or 360 hours, the membrane of the *chorion* continues to increaſe in ſtrength, and its arteries in ſize. Haller ſpeaks of having ſometimes found the latter of a lighter red than the veins, which does not accord with our obſervations. We have generally perceived the arteries and veins to be ſimilar in colour, or at leaſt when a difference did exiſt it was immaterial, and ſometimes the arteries, and ſometimes the veins were the lighter coloured veſſels. The veſſels of the chorion have always appeared darker in our obſervations than thoſe of the yolk-bag, but the character of all the blood is venous in the incubated egg during the latter periods. The reflections of membrane which accompany the principal veſſels of the chorion, are now more firm than before, and continuous with them appears a fine tranſparent membrane that envelopes the yolk as far as the vaſcular circle on the edge of the white, and extends over part of the amnios, to which membrane it adheres, ſo as to cover an irregular triangular portion of the chick in its amnios, and incloſe more looſely the umbilical ſheath with the convolutions of the inteſtines which project from it and the neck of the yolk-bag. This membrane does not appear to have been well underſtood by the older anatomiſts.

They ſometimes ſpeak of it as a layer of the yolk-bag, and at others as the veſicula umbilicalis, or allantois. The beſt deſcription of it has been given by Leveille, who has alſo named it very appropriately *entero-clorilyme*, or *the membrane containing both inteſtines and yolk*.

The origin of this membrane is ſtill involved in a degree of obſcurity. Leveille deſcribed it when perfectly formed, but has thrown no light upon the hiſtory of its growth. The preſent date is the firſt at which it has appeared to us to be perfected, but we conceive that it is one of the original membranes and the ſecond layer, that in the firſt days comes off the vaſcular area as a very fine pellicle. It ſeems to be connected, or rather continued into the peritoneum, lining the abdomen in the late periods of incubation, of which we ſhall ſee farther proofs hereafter. There is no reaſon for ſuppoſing this membrane to be the veſicula umbilicalis, or allantois, as the veſicula is a ſtronger membrane in the middle of incubation than this membrane is ſeveral days afterwards, when it is completely formed. The proper contents of the allantois alſo are found, throughout incubation, within the cavity of the chorion, to the formation of which we have ſuppoſed that bag contributes, but never under the membrane that incloſes the inteſtine and yolk-bag.

Haller ſtates that he examined the *valves* upon the inner ſurface of the *yolk-bag* with a lens, and diſtinctly ſaw the inteſtiniform tubes upon the edges of the valves moſt beautifully curled and folded upon themſelves. He failed to ſee the aperture of theſe tubes. By maceration in water they were detached from the valves, and ſwam in the water. The valves themſelves, by a longer maceration, were alſo ſeparated.

The *chick* increaſes regularly in ſize, though not ſo rapidly as during the early part of incubation. Haller obſerved the feathers upon the *eye-lids* at this period, and that the *ſpleen* had acquired the figure it preſerves through life.

The *curdy*, or *coagulated ſubſtance* is now found in the œſophagus and the crop, as well as in the ſtomach and inteſtines. Harvey found this ſubſtance principally in the ſtomach: this appears to be the caſe, and when met with in other places, it would ſeem to have proceeded from the ſtomach to them.

The end of 16 *days, or* 384 *hours*, the ſpace between the two layers of the membrane lining the ſhell, for containing air, is much increaſed ſince the period at which we have laſt mentioned it. About one-ſixth of the whole cavity of the egg is occupied by air.

This circumſtance depends upon the diminution of the ſubſtance of the white, which is at preſent reduced to a very ſmall ſize.

The texture of the *white* continues to become firmer.

Upon removing the chorion, which now completely encloſes the white, that humour is found to poſſeſs a thin tunic, which is proper to it. This membrane is evidently of a late growth, and appears to be formed by the veſſels of the yolk-bag extending beyond the ſeptum, or that portion of the bag which is bounded by the vaſcular circle, and which is in contact with the white.

The fluid of the *amnios* is ſomewhat diminiſhed.

The *yolk-bag* in the egg of the hen is generally formed into three lobules, although many authors ſpeak only of two lobes at this time; one, which is the moſt diſtinct, but the ſmalleſt, lies upon the ſide of the body of the chick, between the head and the thigh: the two others are placed at the two ends of the chick.

Maitre Jan deſcribes the yolk-bag as being formed only into two lobes, but ready to enter the abdomen, of which he gives a figure at this period, and of a fiſſure that aſcends from the umbilicus, between the two recti muſcles of the belly of the chick. He likewiſe deſcribes the ductus vitello-inteſtinalis for the firſt time, which, with the yolk-bag, he ſucceeded in inflating from the crop of the chick; and he ſays this part is not to be demonſtrated at an earlier period than the end of the 16th day, on account of its extreme tenderneſs; but, as already mentioned, we have found the duct on the 13th day.

Haller found the inteſtines before this period to be irritable. When ſtimulated, they contracted into knots.

The blood-veſſels of the yolk-bag appear fewer and ſmaller, owing, in part, to their being ſo much more involved in the valvular coat than they were in the middle periods of incubation. The branches of the blood-veſſels of the yolk-bag are larger than the trunks, and the veins are ſtill vaſtly greater than the arteries. Haller ſtates that the vein going upon one of the valves, is a larger veſſel than the trunk, from whence all the arteries of the yolk-bag take their origin.

The End of 17 *Days, or* 408 *Hours.*—Haller admits the appearance of three lobes of the yolk at this date, which we have ſeen before.

The *arteries* of the *chorion* are extremely large; we have ſucceeded in introducing a pipe into them, and injecting them with coloured ſize, which makes a beautiful preparation. Haller, in his obſervation of this date, found both the arteries and veins of the chorion to be a purple colour, and the veins more violet than the arteries.

It now appears that there are two ſeries of veſſels belonging to the yolk-bag. The branches, which are ſpread upon the external membrane of the bag, appear to be the ſame which formed the vaſcular area in the early periods of incubation. The veſſels of the internal coat are diſtributed to the valves. Both ſeries contribute to the vaſcular circle, which, as we have before ſtated, is the remains of the vein that formed the contour of the vaſcular area. Maitre Jan ſays there are ſeveral layers of the membrane which contains the yolk, but it is probable that he miſtook for one that membrane which incloſes the yolk-bag, the inteſtines, and a part of the chick.

Coiter has found the *yolk-bag* within the belly of the chick at the 17th day; but the ingurgitation of the yolk is a later event, according to the obſervation of other writers.

There is now a circular arrangement of muſcular fibres around the opening into the belly of the chick at the umbilicus. This ſphincter was not apparent before, and, as we ſhall ſoon find, is a very eſſential ſtructure in the laſt periods of incubation.

If the *yolk-bag* be opened, and the valvular membranes cleaned by frequent ablution and floated in clear water, the ſides of the valves will be found to be perforated by a great number of foramina, ſo as to give the valves the appearance of lace. The inteſtiniform tubes alſo upon the edges of the valves will be partially detached; the portions that remain reſemble pieces of cylindric tubes.

Many of the blood-veſſels upon the external ſurface of the yolk-bag contain apparently but little blood, and have a greeniſh colour, as if conveying a yellow or green fluid.

The End of the 18*th Day, or* 432 *Hours.*—The two layers of the external membrane, which immediately lines the ſhell, are ſeparate for about one-third of their extent, and can with little pains be detached from each other until near the ſmall end of the egg. The quantity of air contained between theſe layers, although much increaſed, is leſs than might be ſuppoſed, as the layers are not far aſunder, except at the great end of the egg.

The *water* of the *amnios* is a good deal diminiſhed, and its membrane is applied in folds to the ſurface of the chick.

The *chorion* has attained a very conſiderable ſtrength, admitting of examination and diſſection, without being previouſly hardened by ſpirits or vinegar. When this membrane is laid open, there is ſome tough lymphy ſubſtance found under it in layers or ſtreaks, which has been miſtaken for a membrane by ſome anatomiſts. There is generally mixed with this ſubſtance a certain quantity of calcareous matter. It has, therefore, been ſuppoſed to be a kind of excrement, or the ſecretion of the kidnies. Theſe white flakes are what have been called *ſtriæ reticulatæ urinæ* by Malpighi, and were deſcribed by him as being found in the allantois.

When the chorion is opened and turned down off the contents of the egg, it appears to be a diſtinct bag, and only connected to the other parts by reflections of fine membrane. Theſe are chiefly in the courſe of the trunks of its blood-veſſels, and at the junction of the yolk and white.

The *yolk-bag* is now often found gathered into more lobules than three, ſome of which have entered the abdomen of the chick, through the aperture at the umbilicus. The forming of the yolk-bag into lobes and lobules, appears to be owing to the contraction of the membrane that contains it, and the inteſtines of the chick; for, when the yolk-bag is taken out of this membrane, it ſpreads out into nearly its original figure, except that there is a marked depreſſion where the white is joined with it, and that the neck of the bag is ſomewhat elongated. It ſeems likewiſe to be the contraction of the ſame membrane which urges the yolk-bag into the cavity of the abdomen of the chick.

The *yolk* appears to be ſomewhat leſs than in the preceding days; but on the cloſeſt examination we have not been able to diſcover any of it in the inteſtinal canal. We have obſerved at this period, although it probably exiſts much ſooner, an appearance of yellow veſſels accompanying on each ſide the blood-veſſels of the yolk in the ſame manner as the ſmall veins generally attend arteries. We have not been able to determine whether this appearance be cauſed by real veſſels filled with a yellow fluid, or by the inner coat of the bag being ſeen through the outer, producing on the edge of the tract of the real blood-veſſels an appearance of yellow lines.

The *chick* has now attained nearly the utmoſt ſize that it will poſſeſs while in the egg. Its form is entirely that of the excluded chick, except that its abdomen is enlarged in proportion to the quantity of the yolk-bag which is admitted into that cavity.

The different organs of the chick are very perfect. The convolutions of the *inteſtines* which were outſide are taken into the belly with a portion of the yolk-bag, as before mentioned. Maitre Jan ſtates that he found about this period the *tympanum* and the *labyrinth* of the *ear* hard, and nearly of their full ſize. All the *bones* have acquired oſſeous matter and conſiderable hardneſs.

The *bile* contained in the *gall-bag* is an intenſe green, and gives that bag a blue colour.

The end of the 19*th day, or* 456 *hours*, the *air-cell* extends round one-half of the cavity of the egg.

The *amnios* is in ſome inſtances found to be ruptured by the bill of the chick.

According to Haller, the chick begins to cry about this period. Harvey and Langly alſo heard the piping of the chick at this date. Some other authors have not noticed the chick to cry until the twentieth day, which agrees with our obſervations. Still, however, the time at which the chick begins to cry is ſubject to vary, according to the degree of heat to which it is expoſed. Thus, in an egg from which no ſound iſſues while it is in the neſt, if placed upon warm water the piping of the chick will be heard.

The *chorion* begins to appear a little faded, the circulation of blood upon the membrane being carried on more ſluggiſhly. This change ſeems to be preparatory to the deſtruction of that membrane which is about to happen.

More than two-thirds of the *yolk-bag* and its contents have been received into the abdomen. If that cavity be opened, it will be ſeen that the bag is preſſed in amongſt the different viſcera, to which its figure is capable of being perfectly accommodated in conſequence of its folds and lobules.

The *white* is reduced to a few irregular-ſhaped knots, which generally contain ſome calcareous matter that appear to remain after all the liquid parts of the albumen have been removed. The knots are compoſed of the chalazæ, and the membrane of the white compreſſed together.

Maitre Jan very readily ſucceeded in diſtending the yolk-bag and the ductus vitello-inteſtinalis, by blowing air into the œſophagus, but did not yet perceive that any of the yolk had paſſed through the duct into the inteſtine.

Haller deſcribes at this date the effects produced upon the valvular ſtructure of the yolk-bag by maceration in water for ſome days.

Having firſt waſhed the ſac containing the yolk with ſeveral waters, he found the edges of the valves covered with the vermiform tubes before deſcribed, which ſeparate and form curves; theſe elongate and expoſe the interval of their two curvatures. They break at the end, and the two ends become nearly ſtraight, remaining attached to the edge of the valve. The breadth of theſe little membranes appears alſo covered with cylindric tubes, ſometimes branched and ſeparated by the reticular intervals. The day after, the yolk-bag having been ſteeped in water, he ſaw the appearance of cylindric tubes forming a net-work upon the membrane which makes the breadth of the valves, and continuous with the vermiform tubes of the edges. He further ſaw that the veſſels of the valves, having arrived there, were covered with ſome very fine ſmall tubes reſembling a powder. The following morning, he ſaw ſome of the tubes which aſcended from the baſe of the valves, and which were continued with the tubes of the edge. They were cylindric as far as he could perceive, and joined in form of a net-work. The ſtraight veſſels went evidently as far as the vaſcular circle of the yolk-bag.

The fourth day many of the tubes had diſappeared, and there only remained on the edge of the valves the membrane which covered the trunk of the veſſel. With reſpect to the nature of the tubes on the ſides of the valves, he found it difficult to pronounce with certainty. By examination with a ſtrong lens he perceived that there were ſome real tubes upon the ſides of the valves, which aſcended in a ſerpentine manner; but thoſe which are the moſt numerous, and which form the net-work on the breadth of the valves, were not determined to be tubes, although they are moſt probably ſo, as they appear cylindric under every point of view, and are continuous with the tubes of the edge.

The fifth day, the veſſels of the edge appeared all uncovered: theſe veſſels preſerved ſome breadth, and a round figure at the edge, and an undulating courſe. It was more eaſy to diſtinguiſh the real veſſels which deſcend from the edge in a ſerpentine manner, and traverſe obliquely the breadth of the membrane, in order to return into the plain between the valves. Haller alſo ſaw very evidently ſome branches which proceed from the veſſels between the valves, and which aſcend in a ſerpentine manner by the ſide of the valves, and communicate with the trunk which runs along the edge. The remainder of the valve was become an open net-work of extreme beauty.

The ſixth day many of the valves had diſappeared, and others preſented only a plaited border, like a meſentery, from which the inteſtines had been removed. Mem. 1. p. 379.

The *chick* at the preſent date is about the ſize that it is immediately after excluſion from the ſhell. It lies coiled round with its head under the right wing.

The *blood-veſſels* in the interior of the chick have attained more of their proper ſize in proportion to the parts they ſupply. The left branch of the aorta, however, which forms the principal umbilical artery, is ſtill nearly equal in magnitude to the aorta itſelf.

Haller obſerved at this period the *vena cava* beat between the lobes of the liver.

The end of the 20*th day, or* 480 *hours*, the *ſhell* is extremely dry, and very fragile, which is occaſioned by the more extenſive detachment of the membrane which is immediately under it. The brittleneſs of the ſhell is a very convenient circumſtance at this period, when it is about to be ruptured by the efforts of the chick.

It is uſual at the preſent date to find the greater number of the eggs in a hen's neſt cracked or chipped near the great end. This is attributed by common people to the parent, who is ſuppoſed, by a particular inſtinct, to know the proper period for the liberation of the young chick. Malpighi likewiſe ſuppoſed that the ſhell was broken by the hen, in which opinion Haller ſeems to concur. He ſtates that he found a fiſſure in the ſhell, and the membranes which incloſed the chick, at the ſame time entire. Maitre Jan, on the contrary, aſcribes the fracture of the ſhell to the chick. He found the beak had lacerated the membranes before the ſhell was broken; and having watched the eggs at the time the chicks began to cry, he did not perceive the hen touch them with her bill, but that the ſhell was ruptured from the inſide, and the fractured portions were puſhed outwards. This account of the mode in which the ſhell is opened, exactly accords with our obſervations. We have ſeen the ſhell evidently broken from within; beſides, the fact of birds being hatched by artificial heat, proves decidedly, that the aſſiſtance of the hen is not neceſſary for the fracture of the egg.

After the ſhell is broken the chick is always heard to cry, and the point of its beak is ſeen to project out of the egg for ſeveral hours before the chick attempts its liberation.

It is reported by common people who have the care of ſitting hens, and it is even aſſerted by ſome anatomiſts, that the cries of the chick are heard before there is any aperture made in the ſhell. Haller relates that he took an egg, in which he diſcovered the piping of the chick, and which was at the ſame time unbroken, and having carefully removed the ſhell, piece by piece, he found that the opaque membrane, which lines the ſhell, was alſo entire, but that there was an opening in the chorion oppoſite to the beak of the chick. He does not ſtate whether the bill had penetrated into the air-cell, but it moſt probably did, as at this period the two layers of the membrane lining the ſhell are ſeparated beyond the ſituation of the beak of the chick. In another obſervation Haller found the chorion entire under the fiſſure in the ſhell, which was on the oppoſite ſide of the egg to the bill of the chick; and therefore he ſuppoſes the ſhell to have been cracked by the hen. We cannot poſitively contradict the aſſertion of the chick uttering ſound before it has the means of freely reſpiring, but we ſhould conceive it extremely improbable; and upon every occaſion where we have heard the piping of the chick iſſue from the egg, we have found that there was a crack or fracture in the ſhell.

Where the chorion is lacerated by the beak of the chick there is always ſome blood ſhed, but the edges of the membrane ſoon dry, which prevents any farther hæmorrhage; for the circulation is not yet interrupted in the chorion by the contraction of the ſphincter at the umbilicus, although Maitre Jan deſcribes the paſſage of the yolk, and the deſtruction of the chorion, as events of the ſame date.

When incubation has proceeded regularly, the whole of the yolk-bag at this period is found within the cavity of the abdomen, which is cloſed by the contraction of the circular faſciculus, of muſcular fibres placed around the umbilicus; but, as already mentioned, this does not, until near the excluſion of the chick, compreſs the umbilical veſſels, ſo as to deſtroy their circulation.

The ingurgitation of the yolk cauſes a great tumefaction of the belly of the chick. The animal reſembles one in a gravid ſtate, but the belly is leſs ſwollen than might have been ſuppoſed from the bulk of the yolk-bag. The latter does not lie in the front of the cavity, but is preſſed in between all the viſcera, and therefore occupies the leaſt poſſible ſpace.

It is remarked by Maitre Jan, that more chicks die about this period than at any other of incubation, which he attributes to the diſtention of the abdomen by the yolk-bag; but we ſhould ſuppoſe that it is the ceſſation of the external circulation upon the membrane of the chorion, which cauſes the great fatality towards the end of incubation.

Maitre Jan ſtates that he diſcovered the fluid of the *yolk* at the 484th hour mixed with the contents of the ſmall inteſtines; but ſome other anatomiſts, who admit the paſſage of the yolk through the ductus vitello inteſtinalis, do not pretend to have detected it in the inteſtine ſo early.

The *chick*, about this period, is ſometimes obſerved to remain for a while perfectly motionleſs. Harvey ſuppoſed that it was aſleep on theſe occaſions. How far he was correct we cannot pretend to ſay.

According to Haller the weight of the yolk is not ſenſibly diminiſhed before its entrance into the belly of the chick. He weighed the entire yolk-bag at the 500dth hour, and found it to be three drachms and two grains. He ſtates that the weight of the yolk, before incubation, was three drachms and ten grains. This diminution of weight is, therefore, not greater than might have been expected from evaporation, or from an original difference in the bulk of the two eggs that were the ſubjects of the experiment.

Haller, in ſeeking for the *allantois*, or *veſicula umbilicalis*, at this period, ſtates, that he could not diſtinguiſh it from the chorion, or rather from a fine membrane he raiſed from the internal ſurface of the chorion by inflation; but he found a little ſac in the form of a pear, extremely vaſcular, full of a yellow mucus, and terminated by a peduncle which was not an inch long. We have already deſcribed the veſicula umbilicalis as being loſt in the formation of the chorion long before the preſent period. Malpighi, likewiſe, ſuppoſed this part to have the ſame deſtination in the latter periods of incubation: and in none of our obſervations have we met with the pear-ſhaped bag mentioned by Haller. We have turned back the chorion at the preſent date, and have found it to be a perfect ſac, ſuch as we have previouſly deſcribed it, and connected with the adjoining membranes by reflections of a very delicate texture. Theſe were readily detached, and left the chorion pendent by its veſſels from the umbilicus of the chick. Beſides the blood-veſſels, we could diſcover a tranſparent filament paſſing to the inverted bag, which appeared to be tubular, and perhaps was the urachus.

The End of 21 *Days, or the full Period of the Incubation of the Hen.*—When the progreſs of incubation has been regular, the chicks are now generally found to have abandoned the eggs, leaving the ſhells with the ſhreds of the chorion and amnios behind them. It happens, however, occaſionally, that ſome of the chicks have been backward in their growth, from the unfavourable poſition of the eggs in the neſt, or the negligence of the hen. Theſe are ſometimes found about this period within the broken ſhell, having the remains of the membranes ſtill attached to the umbilicus.

The ſeparation of the membranes does not appear to be effected by a proceſs of ſlough or of ulceration. They appear rather to be torn off, as ſome ſhreds and a ſhort portion of the trunks of the blood-veſſels are ſeen to project at the umbilicus. The hemorrhage from theſe veſſels alſo is not entirely ſuppreſſed by the conſtriction of the ſphincter muſcle, but in a degree by the aſſiſtance of a clot of blood, which forms in the ends of the torn veſſels.

We have not been able to obſerve whether the complete fracture of the ſhell, previous to the excluſion of the chick, and the detachment of the membranes, are accompliſhed by the efforts of the chick alone, or with the aſſiſtance of the hen.

The belly of the chick, after excluſion, is much enlarged, though leſs tumid than it was when the yolk-bag was firſt taken into the abdomen. It would, therefore, appear that the yolk begins to diminiſh immediately after it is admitted into the belly of the chick, although ſome obſervations of

Haller would lead to a different concluſion. He weighed the egg and its different contents at the 526th hour, and found the entire egg to be 13 drachms and as many grains; the weight of the yolk, with ſome light membranes that adhered to it, was four drachms. The fœtus weighed five drachms and 14 grains. In an egg which had not been ſat upon, he found the weight of the entire egg to be 10 drachms and three-ſixths, and that of the yolk three drachms and 10 grains. This account of the weight is obviouſly incorrect. See EGG.

Many anatomiſts ſtate that they have been able to detect the fluid of the yolk in the inteſtines at this period, and ſome ſuppoſed that they found it had paſſed into the alimentary canal, even before the excluſion of the chick. Haller found yolk in the inteſtines at the end of the 21ſt day, in one inſtance where the chick had not left the egg. Maitre Jan ſaw it after 20 days and ſix hours. Needham deſcribes the gradual paſſage of the yolk into the inteſtine at the end of incubation. Langly alſo found it in the inteſtine at the ſame time. Theod. Aldes ſtates that before the chick was excluded, he could not preſs the ſubſtance of the yolk into the gut, but that immediately afterwards he was able to do ſo. Stenon ſucceeded in preſſing the yolk through the ductus vitello inteſtinalis.

Notwithſtanding the teſtimony of ſo many anatomiſts, we are inclined to believe, that the ſubſtance of the yolk is not conveyed into the inteſtine. We have ſcrupulouſly examined the inteſtines of chicks, both before and after the excluſion from the egg, and in no inſtance could we diſcover with certainty any yolk in them. In the laſt periods of incubation, and until the chick has taken its natural food into the ſtomach, the alimentary canal is filled with a yellow fluid, which it is ſcarcely poſſible to diſtinguiſh from the yolk; therefore, all direct obſervations reſpecting the paſſage of the yolk into the inteſtines muſt be attended with a degree of doubt. There are, nevertheleſs, many reaſons beſides actual examination; for ſuppoſing that the yolk is not conveyed into the ſyſtem of the chick by paſſing firſt into the inteſtinal canal, which we ſhall ſtate in ſpeaking of the uſes of the different parts of the egg, we are further ſupported in our opinion by the authority of Blumenbach, who aſſerts poſitively, that the yolk does not paſs into the inteſtine. We might alſo quote the ſame opinion held by Leveille; but he advances it upon falſe grounds, as he deſcribes the ductus vitello inteſtinalis as a ligament, by which the yolk-bag is ſuſpended to the body of the chick, notwithſtanding the tubular ſtructure of this part is ſo palpable.

The ſubſtance of the yolk at the end of incubation is extremely tenacious or gluey in its conſiſtence, and of a deep green colour, particularly in the centre.

The net-work of the valves upon the inner membrane is very viſible at this period. We have thrown coloured ſize into the blood-veſſels of the yolk, and afterwards ſoftened by maceration, and by frequent ablution detached the inner membrane; when we found that the baſis of the lace-like or reticulated ſtructure of the valves was formed by real blood-veſſels, which preſented the moſt beautiful vaſcular apparatus that we have ever ſeen. This mode of preparation ſhews, that the organization of the internal membrane depends upon the growth of the blood-veſſels of the external membrane of the yolk-bag, and confirms the account we have already given of the formation of the valves. Haller conſidered the veſſels diſtributed in the valvular ſtructure of the bag as being chiefly, if not entirely, venous; but we found them moſt eaſily injected from the aorta of the chick. In the early periods of incubation we know that the branches of the veins of the yolk-bag are larger and more numerous than thoſe of the arteries, but we are inclined to believe the arterial branches predominate towards the end of incubation. Further obſervations, however, are neceſſary to explain the vacſular ſyſtem of this membrane.

Several anatomiſts ſpeak of a new membrane being found upon the yolk-bag towards the end of incubation, which is continuous with the ſkin of the chick. Haller, in ſome obſervations, deſcribes this membrane in a manner which leaves no doubt of its being the ſame that we have already noticed as including the yolk-bag and inteſtines of the chick, when they are on the outſide of the body.

We, as well as others, have found the appearance of a new tranſparent membrane covering the yolk-bag after it has entered the abdomen of the chick. This membrane ſeems to be the continuation of the peritoneum. It adheres to the inſide of the umbilicus, and to that point of the yolk-bag where the white and chalazæ were attached. We have not had it in our power to inveſtigate completely the connections of the yolk-bag with the peritoneal coat of the parietes of the belly, but we believe at preſent that any appearance of a third tunic to the bag is derived from the peritoneum.

Haller ſtates obſervations made upon the *allantois* or *veſicula umbilicalis*, even to the laſt day of incubation. He mentions that he found under the chorion an extremely fine membrane which was incorporated with the tiſſue of white filaments or ſtreaks that we have ſpoken of before. He deſcribes this membrane as giving an immediate covering to the chick: it was ſo tender that inflation burſt it. He ſuppoſes it to be either the amnios or the allantois. In the next paragraph he ſays, he ſought the centre of the yolk, and found the urachus there without having any connection with the allantois. He inflated it, one part of the air went out at the anus; another elevated the membranes of the rectum. He next paſſed an extremely fine probe into the urachus, and found an orifice on the left ſide, between the anus and that veſicle that the urachus produced by inflation in the rectum: the probe would not enter the plicated muſcular ſac, which is behind the rectum and at the ſide of the vagina.

This account appears to us to be very inaccurate in ſome points. The membrane which Haller took for the allantois was moſt probably that which envelopes the yolk-bag and inteſtines. The urachus at the periods of incubation, when it can be found, has no connection with the yolk-bag. The foramen on the left ſide of the anus appears to have been made by the probe, and the muſcular ſac he ſpeaks of was the burſa Fabricii.

Changes which take place in the Structure of the Chick after Incubation.—Theſe chiefly relate to the diſappearance of the yolk, and the degeneracy of the arterial ducts, which in the fœtus conveyed the blood from the pulmonary artery into the aorta.

In two days after excluſion from the egg, the *yolk* is very ſenſibly diminiſhed in quantity, and its conſiſtence is even more tenacious or gluey than it was before.

The *right ductus arterioſus*, which is the firſt obliterated, becomes as ſmall as a filament. The *left* is, according to Haller, diminiſhed three times the ſize it had during incubation.

In four days after excluſion, the *yolk* is found to be reduced two-thirds of its bulk. In proportion as the ſubſtance of the yolk diſappears, the membranes forming the bag alſo diminiſh. The adheſion which we have mentioned the yolk-bag to have with the internal part of the umbilicus, after its admiſſion into the abdomen, is now undone. It would appear that this attachment is produced by the contraction of the ſphincter muſcle upon the remnant of the veſſels and of the membranes connected with the centre of the yolk-bag.

It is now particularly eaſy to ſee the origin and courſe of the proper *blood-veſſels* of the yolk. The *veins* belong to a ſingle trunk, which is continued along the meſentery, and ends in the vena portæ; it is evidently a branch of the meſenteric vein. The *arteries* are alſo derived from a ſingle trunk, which is the principal branch of the meſenteric artery. This trunk, in ſome points of view, appears to be double; it divides, paſſes on each ſide of the inteſtine, and then unites to form a ſingle veſſel previous to its diſtribution in the membranes of the yolk-bag. Theſe veſſels, and the ductus vitello inteſtinalis, are connected together by ſome fine folds of peritoneum, which are the continuation of the meſentery.

The cavity of the *right ductus arterioſus* is completely obliterated, but the *left* is ſcarcely more diminiſhed than it was on the ſecond day.

In eight days after excluſion, the *yolk* is reduced to the ſize of a hazel nut. The *ductus vitello inteſtinalis* becomes thicker, and more reſembles the inteſtine than it did before.

The valvular ſtructure upon the internal ſurface of the yolk-bag is no longer apparent.

The *right ductus arterioſus,* although reduced to the ſize of a filament, is enlarged where it enters the aorta.

The left *duct* is likewiſe obliterated at its origin from the pulmonary artery; it is a filament, but is inferiorly white, opaque, and larger. Both theſe ducts, therefore, decline firſt at the ſuperior part, where they come from the pulmonary artery.

The *gizzard* of the chick, eſpecially if the animal has had the opportunity of picking up ſmall ſtones with its food, is thick and muſcular; and the internal coat, which during incubation was ſoft and ſpongy, is now become firm and dry.

In 16 *days after excluſion,* according to Haller, the ſubſtance of the *yolk* is entirely conſumed; there remains but a ſmall thin ſac, leſs than a pea, containing a granular ſubſtance, which is partly of a calcareous nature, and which is the dregs of the ſubſtance of the yolk.

Twenty-ſeven days after excluſion, Haller found both the *right ductus arterioſus,* and the left, ſtill remaining in the form of filaments. The right was ſmaller than the left. The latter was ſtill open at its junction with the aorta.

In three months after excluſion, the *ductus vitello inteſtinalis* is found to be turned down upon the ſide of the inteſtine, to which it evidently forms an appendix. At its extremity may ſtill be ſeen the remnant of the yolk-bag, reduced to nearly the ſize of the head of a pin. It is uſually dark coloured, from the nature of its contents.

In the adult bird, Stenon, Needham, and Maitre Jan, have recognized the *ductus vitello inteſtinalis* in the form of a ſmall cæcum. It is ſituated on the alimentary canal, about midway between the ſtomach and the anus.

Needham deſcribes it as being half an inch long, but this is incorrect with reſpect to any of the *gallinaceous* tribe, but in ſome other birds we have found it of a very remarkable ſize.

In the *ſnibe* it exceeds in length the cæca of the large inteſtine.

In the *curlew* it is about an inch long, and very capacious.

In the *woodcock* it is nearly as large.

It is above an inch long, and very ſlender, in the *black coot*: the cæca of the great inteſtines are alſo ſingularly long and ſlender in this bird.

In all the paſſerine birds it is ſmall.

In the *ſwan*, *gooſe*, and *duck* it is of a moderate ſize.

It is remarkably ſmall in the *heron* and in the *hawk.*

In all the birds we have examined, there exiſts during life ſome remnant of the yolk-bag at the end of the cæcum, formed by the ductus vitello inteſtinalis. This is more particularly remarkable in the *paſſerine* and *accipitrine* birds. The *nightingale* has a little ſac, about the ſize of a ſmall pea, attached to the end of this proceſs of the inteſtine.

Although there is ſo much variety with reſpect to the figure and ſize of the cæcum of the ſmall inteſtines of birds, the ſtructure of this part is conſtantly the ſame in every ſpecies. It appears to poſſeſs but two coats; one is the continuation of the peritoneum, covering the inteſtine: the other correſponds to the mucous membrane of the gut. The internal ſurface of the cæcum exhibits ſmall cells ſimilar to thoſe points of the alimentary canal on which the mucous glands are congregated. This ſtructure exiſts whether the internal membrane of the inteſtine be plicated or villous.

We have not found the appendix produced by the ductus vitello inteſtinalis to receive, in any inſtance, the contents of the alimentary canal. It is filled with a mucous fluid, which appears to be ſecreted from its internal ſurface. There is, therefore, every reaſon to ſuppoſe that this appendix performs the office of a mucous gland in the adult bird. The great ſize which it poſſeſſes in the *ſnipe*, *curlew*, *woodcock*, and *coot* is probably dependent upon the nature of the food of theſe birds, although we cannot at preſent perceive in what manner this part is ſo particularly uſeful to them. See Phil. Tranſ. part ii. 1811.

In the *Plate* deſigned to illuſtrate the incubation of the egg, *fig.* 1. exhibits an egg with a portion of the ſhell and the membrane underneath it, removed at the great end: *a* is the firſt appearance of the fœtus as it is ſeen in the cicatricula, through the membrane which covers it; around it are the concentric circles or waves (*halones*).

Fig. 2. repreſents an egg opened in the ſame manner in order to expoſe the fœtus when it is a little more advanced, with the commencement of the vaſcular area; *a*, the fœtus ſomewhat formed with the head like the top of a club; *b*, the contour of the vaſcular area aſſuming the heart-ſhape: it does not yet circulate red blood, but within it are ſeen the rudiments of veſſels containing a greeniſh fluid. Some of theſe points are of a darker colour, and are the firſt appearance of the real blood.

Fig. 3. is an egg alſo with the ſhell of the great end removed; *a* is the fœtal chick; *b* refers to the pulſating points that conſtitute the heart; *c* repreſents the appearance of the vaſcular area after the circulation of blood is perfected in it.

Fig. 4. exhibits a magnified view of the portion of the membranes at the great end of the egg, including the chick and vaſcular area about the fourth day of incubation; *a* is the thin gliſtening membrane which readily ſeparates at this period from the reſt, turned back; *b* is the fine tranſparent membrane immediately under the firſt, alſo turned a little off; *c* the chick contained in the amnios; *d* the veſicula umbilicalis attached to the chick; *e* the external membrane of the yolk-bag on which the veſſels compoſing the vaſcular area are ſeen to ſpread; *f* is the internal pulpy membrane of the yolk-bag which afterwards produces the valves, the preceding membrane being partially removed to expoſe it.

Fig. 5. exhibits a portion of the yolk-bag with the chick and veſicula umbilicalis conſiderably magnified; *a* the chick; *b* the amnios; *c* the membranous connection the amnios has with the veſicula umbilicalis; *d* the veſicula, the neck of which is ſeen to enter the opening at the umbilicus of the chick.

Fig. 6. is a magnified view of the heart of the chick as it appears when firſt formed ; *a* indicates the horſe-ſhoe dilatation mentioned in the deſcription of that organ on the ſecond day.

Fig. 7. ſhews the heart and large veſſels of the chick magnified after theſe parts are more perfectly formed ; *a* is the vena cava ; *b* the auricle ; *c* the auricular canal ; *d* the ſingle ventricle ; *e* the bulb of the aorta ; *f* the principal artery.

Fig. 8. is a view, alſo magnified, of the heart, pulmonary arteries, lungs, and aorta of the chick ; *a* is the heart ſeen on the poſterior ſide ; *b*, *b*, the two arteries which ſend off the pulmonary arteries, and afterwards concur towards the formation of the abdominal aorta. Theſe veſſels, after parting with their branches to the lungs, are analogous to the ductus arterioſus of mammalia ; *c*, *c*, are the pulmonary branches of the veſſels laſt mentioned ; *d* the third veſſel of the heart, which correſponds to the ſuperior part of the aorta ; *e* the abdominal aorta, formed as already deſcribed ; *f*, *f*, the two lungs.

Fig. 9. is a view of the internal ſurface of the yolk-bag after the valves have begun to form upon it.

Fig. 10. ſhews a ſimilar view of the internal membrane of the yolk-bag, when the valvular apparatus is completely formed ; *a*, *a*, *a*, indicate ſome of the inteſtiniform tubes upon the edges of the valves ; *b*, *b*, the appearance of veſſels in the intervals between the valves. The valvular projections themſelves are ſufficiently evident.

Fig. 11. ſhews a portion of one of the valves of the yolk-bag magnified ; *a* the baſis of the valve, where the principal veſſel runs ; *b* the plaits or folds upon its ſide ; *c* the inteſtiniform tubes upon the edge of the valve.

Fig. 12. is a magnified view of a portion of a valve of the yolk-bag after it had been converted into a fine lace, the veſſels injected, and the internal membrane waſhed, ſo that the real blood-veſſels alone remain ; *a* is the principal veſſel that runs along the baſe of the valve ; *b* the one which goes along the free edge ; *c* the lace-like ramification of veſſels between theſe two.

Fig. 13. repreſents the yolk-bag, and the portion of the inteſtine with which it is connected, taken out of the chick a few days after incubation ; *a* is the yolk-bag very much reduced in ſize, and of an irregular form ; *b* the piece of inteſtine to which the yolk-bag is attached ; *c* the ductus vitello inteſtinalis imperfectly ſeen, as it is partly covered by the blood-veſſels of the yolk-bag ; *d* the branch of the meſenteric vein, which furniſhes, in the early periods of incubation, the veins of the vaſcular area ; *e* the branch of the meſenteric artery, which goes to the yolk-bag. It divides, paſſes on each ſide of the inteſtine, and unites again before it ramifies upon the yolk-bag.

Fig. 14. ſhews the chick after the yolk-bag had been taken into the belly ; *a* the umbilical opening ſurrounding the aperture, which is cloſed, in the preſent inſtance, by the contraction of this muſcle ; *b* ſome lacerated veſſels, and a portion of the chorion hanging from the umbilical aperture ; *c* the belly of the chick diſtended in conſequence of the admiſſion of the yolk-bag.

Fig. 15. is a plan of the relative poſition and magnitude of the contents of the egg about the ninth day of incubation. The view is procured by firſt boiling the entire egg, and afterwards making an equal ſection ; *a* the edge of the ſhell ; *b* the cavity left between the two layers of the membrane that lines the ſhell to contain air. This cavity is conſiderable at the preſent period ; *c* the chick in its amnios ; *d* the yolk ; *e* the cut edge of the yolk-bag ; *f* the white which has deſcended to the ſmall end of the egg and diminiſhed ; *g* the chalazæ, much nearer each other than they were before incubation.

Fig. 16. exhibits a view of the contents of the egg, with the chorion cut open and turned down off the other parts ; *a* the chick ſeen obſcurely, as it is in ſome meaſure covered by the membrane that includes the yolk-bag and inteſtines, beſides being ſurrounded by the amnios, the fluid of which, at the preſent period is greeniſh ; *b b* the amnios ſeen at each end of the chick ; *c* indicates the yolk-bag, which is divided into three lobes ; one of them is ſeen to lie upon the ſide of the chick ; the blood-veſſels of the yolk appear ſmall, and are indiſtinctly ſeen ; *d* ſome folds of the membrane which invelopes the yolk-bag, inteſtines, and a part of the chick ; *e* the white contained in its proper membrane, and very much reduced in ſize ; *f* the chorion turned down, and therefore the ſurface that is ſeen is the internal ; *g*, *g*, *g*, reflections of fine membrane which attach the chorion to the other membranes ; *h*, *h*, the two trunks of the umbilical arteries, which each divide into two branches, and are diſtributed to the chorion.

Fig. 17. is intended to explain the formation of that membrane which includes the yolk-bag and the inteſtines of the chick, and for this purpoſe the chorion is intirely removed ; *a* is the chick contained in the amnios ; *b* indicates the membrane of the yolk-bag and inteſtines ; it is ſeen to cover a certain extent of the amnios and chick ; it deſcends poſteriorly to be connected to the ſeptum, between the yolk-bag and the white : anteriorly it is laid open, in order to turn out the yolk-bag, which was before contained in this membrane. Within the chink made by the inciſion are to be ſeen the inteſtines of the chick perfectly uncovered and deſignated by *c*. The yolk-bag hangs by the ductus vitello inteſtinalis and its blood-veſſels, and is marked by the letter *d*.

Fig. 18. ſhews an egg with the great end fractured previous to the excluſion of the chick : ſome more pieces of the ſhell are removed in order to bring into view the membranes that are lacerated by the bill of the chick ; *a* is that portion of the membrane under the ſhell which forms the air-cell, and in which there is a ſmall aperture. The chorion and amnios are torn to a greater extent to permit the bill of the chick to appear on the outſide of the ſhell ; *b* the bill of the chick : beſide it are ſeen ſome points of feathers projecting out of the opening made in the outer membrane.

Fig. 19. is a portion of the ſmall inteſtine taken from the adult bird, on which the appendix is placed, that we have deſcribed as the remnant of the ductus vitello inteſtinalis ; *a* the inteſtine ; *b* the appendix or cæcum ; *c* is a little knot which was, during fœtal life, the yolk-bag.

In ſome of the preceding figures, the form of the chick is repreſented at different ages, which the reader will underſtand without the letters of reference.

Of the Uſes of the different Parts of the Egg during Incubation, and after the Excluſion of the Chick.—Although there can be no doubt that the chick derives its nutriment from the humours of the egg, the mode in which this is effected is involved in conſiderable obſcurity. Anatomiſts have entertained very different opinions upon the ſubject. Some have ſuppoſed that both in mammiferous animals and birds, the fœtus is nouriſhed by ſwallowing or abſorbing the liquor amnii.

Heiſter, in his Compendium of Anatomy, ſtates, that after the contents of the uterus of the *cow* were frozen, he found a piece of ice of the thickneſs of a finger extended from the congealed amnios into the mouth of the fœtus, and down the œſophagus as far as the ſtomach.

There have been ſometimes ſeen alſo in the ſtomach of the *fœtal calf* the ſame kind of fatty concretions, that uſually exiſt in the amnios of this animal. The hairs of the *calf* have been diſcovered in the meconium. New-born infants have been obſerved to vomit a fluid reſembling the liquor amnii.

It has been remarked by Harvey, Haller, and ſeveral other writers upon incubation, that the fœtal chick frequently opens and ſhuts its mouth while incloſed in the amnios, as if it were performing the act of ſwallowing.

The preceding facts leave no doubt that the water of the amnios paſſes into the ſtomach of the fœtus, but by no means proves that it contributes to the nouriſhment of the young animal, but rather the contrary, as if it were either digeſted in the ſtomach, or conſumed by abſorption, it could not be found towards the end of geſtation, or afterbirth, in the quantity reported.

Thoſe who give credit to the nutrition of the fœtus by the liquor amnii, cite ſome remarkable caſes in which the umbilical cord is ſaid to have been deſtroyed before birth, or in which the infant has been born with the cicatrix at the umbilicus perfectly formed. See Obſerv. rarior cent poſt pars 1. obſ. 32.—Journal des ſavans, année 1673, p. 69. Obſervat. communiq. par Chatton.—F. Hoffmann & Triller Diſſert. de pinguid e ſucco nutr. ſuperfl. p. 10. and Rommel Ephemer. nat. cur. dic. 2 à 7, obſ. 209.

It ſhould be remarked, that of theſe obſervations, ſome are related in a manner which makes their accuracy very doubtful; and others, even if correctly ſtated, do not prove the point they are propoſed to eſtabliſh. Thus the infant with the cicatrized navel was not ſeen by Chatton until five months after birth; and in ſome of the caſes where the cord was ſaid to be injured or putrid while the child was alive, it does not appear that the circulation had been deſtroyed.

We ſhould not have noticed the doctrine of the nutrition of the fœtus from the liquor amnii, as it is generally diſcredited, had it not been advanced with ſome limitation by Lobſtein in a modern publication. This author does not pretend that the fœtus ſwallows the liquor amnii, he allows that the young animal exiſts and increaſes in growth, before the digeſtive organs or even the mouth are formed. He is alſo aware, that there have been monſters produced in whom the head was wanting. He therefore ſuppoſes, that the fluid of the amnios is taken into the body of the fœtus by the abſorbents of the ſkin, which opinion he grounds upon the following circumſtances: Many of the cold-blooded animals, he ſays, have no placenta, but in every ſpecies the fœtus floats in a clear liquor, analogous to that of the amnios. This fluid, he remarks, diminiſhes in proportion to the growth of the fœtus; it likewiſe remains uncorrupted during fœtal life, which fact, he thinks, can only be explained by its paſſing ſucceſſively into the body of the young animal. (Lobſtein ſur la Nutrition du Fœtus, § 88.) Our reply to this reaſoning would be, that the liquor amnii is not a nutritive fluid perhaps in any inſtance; that when firſt perceived, it is in a very ſmall quantity: it is, in the higher claſſes of animals, contained in a membrane which is continuous with the ſkin of the fœtus, and which membrane further derives its blood-veſſels from the fœtus. It is, therefore, a ſecretion of the young animal. During ſeveral days of incubation it increaſes as the chick grows, and in the latter periods does not perhaps actually diminiſh in quantity, but ceaſes to increaſe in proportion to the developement of the chick; for which reaſon it appears leſs than it did when the chick was ſmall. The quantity of the liquor amnii at any given time, even admitting that it is not ſecreted by the fœtus, would be quite inſufficient for the formation of the latter. The principal part of this fluid alſo is loſt when the membrane that contains it is ruptured, previous to the liberation of the young animal from the uterus or the egg. We ſhould, on all theſe grounds, deny that the liquor amnii is deſtined to ſuſtain the fœtus in any circumſtances.

In all oviparous animals, there is no neceſſity for ſuppoſing the liquor amnii to be a nutritive fluid, as there are other humours provided for the purpoſe of nouriſhing the fœtus. The ſources of nutriment, during fœtal life, are particularly evident in the ovum of birds.

In the hiſtory of incubation it will be found, that the albumen begins to diminiſh as ſoon as the fœtus becomes apparent, that it continues to decreaſe regularly as the chick grows, and that this fluid is entirely conſumed at the end of incubation: there is, therefore, no doubt that the white of the egg is the ſubſtance from which the chick is formed. It has been ſuppoſed by ſome writers, that the yolk alſo contributes to the ſupport of the chick while in the egg. This opinion reſts chiefly upon the circumſtance of the yolk becoming larger and more fluid after the white begins to diminiſh, which has been attributed to the albumen paſſing into it, that the two fluids might be mixed together, and afterwards converted into the ſubſtance of the chick. Maitre Jan, Leveille, and others believed, that the white is abſorbed by the chalazæ, and thus conveyed into the yolk-bag, and Leveille has even pretended to demonſtrate the tubular ſtructure of one of the chalazæ. We have already ſtated, that by the ſtricteſt examination we could not perceive the ſtructure deſcribed by Leveille; we are therefore led to conclude, that the fluidity of the yolk, during incubation, is occaſioned by the organization of that humour undergoing a change from the application of heat. We have found alſo the yolk become fluid when eggs were ſat upon, which had not been fecundated by the cock, and in which the white was not ſenſibly diminiſhed. The weight of the yolk at the end of incubation, almoſt proves that it is not concerned in the nouriſhment of the chick, until after the animal is excluded from the egg.

We confeſs, however, that we are unable to form a decided opinion with reſpect to the manner in which the albumen is carried into the body of the chick. Throughout incubation the white tends to the lower and ſmall end of the egg; the chick is placed at the upper and great end. There is, therefore, no direct communication between the chick and the albumen. The blood-veſſels of the egg have apparently no immediate connection with the white, until its proper membrane is formed, at which time this humour is already much reduced, and even then there are only a few wandering veſſels ſpread over its membrane. Theſe facts afford reaſon for the ſuppoſition that the white paſſes into the yolk-bag, through the chalazæ; but, on the other hand, it is ſcarcely credible that the white, after being mixed with the yolk, ſhould alone be abſorbed during incubation, and the latter fluid left undiminiſhed.

The chalazæ, whether they perform the office of abſorbents or not, act as ligaments to the yolk-bag, and have the effect of keeping, throughout incubation, that ſurface of the bag uppermoſt on which the chick is ſituated, in order that it may receive heat from the hen. See EGG.

The uſe of the veſicula umbilicalis is a ſubject on which no ſatiſfactory theory has been yet made out.

The older anatomiſts ſuppoſed this part to be a reſervoir of urine, and gave it the name of *allantois*. Lobſtein conſiders the fluid of the veſicula and the allantois as the nutriment of the fœtus during the firſt periods of its exiſtence. Soemmerring and Blumenbach ſuppoſe that the veſicula umbilicalis is intended for the nouriſhment of the fœtus in the human ſubject. Although it does not appear that this uſe of the veſicula or allantois has been in any degree proved, the arguments employed are concluſive againſt it being a reſervoir for urine, and particularly ſo with reſpect to birds and the human ſubject.

The veſicula umbilicalis attains a conſiderable ſize, and is filled with its proper fluid before the kidnies exiſt; and although the membrane continues to increaſe, the quantity of the fluid it contains by no means keeps pace with the growth of the kidnies. We cannot admit the reaſoning of Haller, who concludes that the exiſtence of fluid in the allantois is a proof that the kidnies ſecrete urine before they are viſible. It has not yet been aſcertained that the fluid contained in the allantois is urine even in quadrupeds, where this bag communicates ſo plainly with the bladder. Lobſtein found, after the allantois had acquired a very conſiderable bulk, that the kidnies were ſmall and pale, and reſembled organs which had not yet been called into action. The bladder alſo was contracted. He very judiciouſly remarks, that if the allantois were diſtended to the ſize that it is known to poſſeſs in the early periods of geſtation and incubation by the ſecretion of the kidnies, it would become before birth a moſt prodigious ſac. It is extremely improbable that the ſecretion of urine ſhould diminiſh or be ſuſpended after the kidnies were perfectly formed, by which ſuppoſition alone the ſmaller relative ſize of the allantois in the latter periods of fœtal life could be explained

We may further obſerve, that there is no reſervoir provided for any of the other ſecretions of the fœtus, and that even the gall-bag is not remarkably diſtended, although it evidently contains bile ſome time before birth, and notwithſtanding the liver is the largeſt gland in the body.

In deſcribing the progreſs of incubation, we have mentioned, that the veſicula umbilicalis of birds contributes to the formation of the membrane called the chorion; that its fluid diſappears, leaving behind it ſome layers of a ſoft calcareous ſubſtance, reſembling the excrement of birds, or rather the ſolid parts of the urine of thoſe animals. This excrementitious matter has been conſidered a proof of the veſicula being the receptacle of the urine, but it ſhould be obſerved that the ſame ſort of ſubſtance is found after the conſumption of all the fluids of the egg.

The functions of the veſicula umbilicalis in birds, if there be any peculiar to it, are loſt in thoſe of the chorion.

By recurring to the hiſtory of incubation, it will be found that the external membrane of the yolk-bag, on which the vaſcular area is ſpread, and the chorion, receive a vaſtly larger quantity of blood than circulates at any one moment in the body of the chick. The chorion is not originally a vaſcular membrane; its veſſels ariſe with the veſicula umbilicalis, by which they are conducted from the body of the fœtus. The vaſcularity of the chorion in ſome degree ſucceeds that of the vaſcular area; it appertains chiefly to the arterial ſyſtem, whilſt that of the area is almoſt entirely produced by veins.

The uſe moſt commonly aſcribed to theſe two great ſyſtems of extraneous veſſels, is the oxydation of the blood of the fœtus, for which purpoſe it is alſo believed that the air is admitted into the great end of the egg. We have, however, been led to entertain a different opinion of the offices of the vaſcular area, chorion, and air-cell, in conſequence of ſome experiments we have made, which we ſhall lay before the reader.

Experiment 1.—Two eggs of a *hen* were opened at the great end by deſtroying the ſhell and outer layer of the membrane compoſing the air-cell. The blood-veſſels were ſeen through the membrane of a deep purple colour. Being expoſed to the atmoſpheric air, they became, in a few minutes, a vivid ſcarlet. The ſame eggs were then placed in a jar filled with fixed air, and their blood very ſoon reaſſumed its original purple colour; and upon the eggs being again brought into the common air, the ſcarlet colour of the blood was ſpeedily revived. One of theſe eggs had its blood rendered venous and the other arterial, in the manner above-mentioned. Both were then placed in a veſſel of water, in which they remained all night, and on the next morning each continued to preſerve its proper colour.

Ex. 2.—We took an egg which had been ſat upon 18 days, and having removed a ſquare portion of the ſhell and membrane forming the air-cell, about a quarter of an inch in ſize, it was placed in a jar of carbonic acid gas, over a bath of quickſilver, which was kept throughout the experiment, as nearly as poſſible, at the temperature of 104° Fahrenheit. The motions of the chick cauſe an egg to roll upon a ſmooth ſurface, but in this inſtance no motion was perceived. After the egg had remained an hour in the fixed air it was taken out, and the aperture of the ſhell was carefully cloſed with paper and glue, and two hours elapſed before the egg began to roll upon the ſurface of the mercury. Upon this occaſion, therefore, the chick appeared to have been ſubmitted three hours to the influence of carbonic acid gas without being deſtroyed.

Ex. 3.—An egg, at the 18th day of incubation, was deprived of the greateſt part of the ſhell, and of the membrane that lines the ſhell; ſo that the veſſels of the chorion were fully expoſed. The membrane of the chorion was moiſtened to increaſe the effect. The egg was ſuffered to remain for 25 minutes in the fixed air, during which time the chick ſhewed no motion; but upon being removed into atmoſpheric air it ſtruggled as uſual.

Ex. 4.—The air contained in the cells, during the latter ſtages of incubation, was collected from a number of eggs, and ſubjected to experiment in a graduated glaſs tube. It afforded, as nearly as may be, the ſame products that are obtained from atmoſpheric air, after it has been ſpoiled by reſpiration; from which it would appear, that it was the preſence of undiluted fixed air in the 2d and 3d experiments that cauſed the motions of the chick to ceaſe, and not the abſence of oxygen gas.

Ex. 5.—Being aware of the fatal effects upon the chick, which have been reported to follow covering the ſhell of the egg, ſo as to ſtop the further admiſſion of air into it, we varniſhed the ſurface of ſeveral eggs at different periods of incubation. The reſult of this experiment was nearly the ſame in every inſtance. The chick always died; not, however, immediately, but in two, three, or four days, and apparently not in conſequence of being unſupplied with freſh air, but from being unprovided with any kind of air to occupy the ſpace cauſed by the expenditure of the fluid contents of the egg in the formation of the chick: for, in theſe caſes, we found the yolk more or leſs diſorganized, the membranes ſometimes ruptured, and the fœtus always malformed or imperfectly developed. If the death of the chick had been occaſioned by the deprivation of oxygen, it would have been immediate, and unattended with any change in the ſtructure of the fœtus.

The gradual admiſſion of air into the eggs of birds takes place as a matter of neceſſity, becauſe the ſhell, being hard and unyielding, cannot accommodate its form to the bulk of its contents in proportion as they diminiſh; for the parts originally contained in the egg occupy a much larger ſpace, as already mentioned, than when the chick is fully formed.

The preceding experiments prove that the air does not paſs into the egg for the purpoſe of effecting any change in the blood of the fœtal chick, ſimilar to the proceſs of reſpiration, as has been generally ſuppoſed. It is true, nevertheleſs, that when the blood is firſt expoſed to the air contained in the great end of the egg, it becomes oxydated by it ; and hence, during the firſt days of incubation, all the blood-veſſels of the vaſcular area are obſerved to be of an arterial colour : but as there are no means of expelling the air as it becomes ſpoiled, and as the ſupply of pure air afterwards is too ſmall in quantity to produce any effect upon the blood, all the veſſels are of the purple or venous colour in the latter periods of incubation. This appearance of the blood has been obſerved to exiſt by many writers upon incubation, and coincides with the experiments we have related above.

It may be aſked, what end is anſwered by the diſtribution of ſo much blood to the membranes of the egg, if it be not for its expoſure to oxygen gas? This is a queſtion which, perhaps, cannot be ſolved by direct experiments.

We conceive, however, that it is neceſſary, during fœtal life, to have a greater quantity of blood formed than is employed in the organs of the young animal. The functions of the blood-veſſels of the fœtus are almoſt confined to the creation of its body ; but in the adult animal the principal part of the maſs of blood is conſumed in furniſhing the various ſecretions. The vaſcular membranes of the ovum may be conſidered as performing the office of the various ſecretory organs, the actions of which are dormant, at leaſt during the early periods of fœtal life. By this means alſo the organs of the body are accuſtomed to the preparation and preſence of a quantity of blood which is wanted immediately after the young animal leaves the uterus or the egg : indeed, without ſuch a proviſion, it would ſeem to be impoſſible for the fœtus to aſſume, in a moment, the functions of an independent ſtate of exiſtence.

Further, the extraneous circulation on the membranes appears to be the means by which the nutritive fluids of the egg are converted into blood. This is almoſt demonſtrated in the vaſcular area, in which the red blood appears before its veſſels have any viſible connection with the body of the chick.

The *membrane* containing the vaſcular area, therefore, we deem the organ of nutriment and aſſimilation. It correſponds to the different viſcera which convert the food into blood in the full-grown or perfect animal. The *chorion* of birds ſupplies the place of the viſcera, which return the particles of the adult body to the common ſtock of nature. We could draw many arguments in ſupport of this theory from the anatomy of the lower claſſes of animals, and from the ſtructure of the vaſcular ſyſtem in particular animals of a higher rank ; but it does not ſeem conſiſtent, with the nature of the preſent article, to enter into an extenſive phyſiological diſcuſſion.

If it be admitted that the blood of the fœtus does not receive that effect from the air which gives the arterial character, it becomes deſirable to aſcertain the power of the fœtus for generating animal heat. With this view we have inſtituted the following experiments.

Ex. 1.—An egg, on which the hen had ſat 17 days, was placed upon a bath of mercury heated to 104° of Fahrenheit, and kept at that temperature for ſeveral hours. The heat of the room was 75°. The upper ſurface of the membranes, when the ſhell was broken to admit the thermometer, raiſed the inſtrument to 92°. The interior of the egg was 95°, and on the inſtrument being thruſt down ſo as to touch that part of the ſhell in contact with the mercury, it did not riſe higher than 100°. From this experiment, the ſtandard heat of the chick appeared to be about 95°.

Ex. 2.—An egg, at the ſame period of incubation as the laſt, had the ſhell entirely removed, and was placed upon a mercurial bath at the heat of 83°, the air of the apartment being 75°. The centre of the egg preſerved the inſtrument at 88°, and when puſhed down upon the membranes next the mercury, it did not fall below 85°.

Ex. 3.—A chick, about 18 days old, was removed from the egg and its membranes, and expoſed for ſome time upon the ſurface of a bath of quickſilver at the temperature of 79°, and becoming gradually cooler as the heat of the ſurrounding air was 75°. The thermometer was introduced into the thorax of the chick, and ſtood at 80° for a ſhort time, even after the chick had died.

The heat of the different parts of the incubated egg cannot be expected to correſpond with each other as long as external heat or cold is applied to one ſurface only, but the three laſt-mentioned experiments, notwithſtanding, appear to us concluſive, with reſpect to the fœtal chick poſſeſſing an independent temperature, and being capable of reſiſting, to a certain extent, both foreign heat and cold.

It is proper to obſerve, that we have made ſome experiments with reſpect to the oxydation of the blood, and the animal heat of the fœtus in mammalia, which entirely correſpond in their reſults with thoſe above related ; and, therefore, fortify our opinion with regard to the abſence of any proceſs analogous to reſpiration during fœtal exiſtence, and likewiſe prove that the young animal has an independent temperature.

We have already mentioned that the yolk loſes very little, if any, of its original weight during incubation ; but that after the chick is excluded from the ſhell it is ſpeedily conſumed. This humour, therefore, is obviouſly deſigned for a proviſional nutriment to ſuſtain the chick until it is able to procure a ſufficient quantity of its natural food. This diſpoſition of the yolk is particularly neceſſary to thoſe birds that live in a wild ſtate, but is uſeful to all.

Anatomiſts are divided with reſpect to the manner in which the yolk is conveyed into the ſyſtem of the chick. Some aſſert that it paſſes into the alimentary canal, through the ductus vitello inteſtinalis, where it is digeſted previous to its being abſorbed by the lacteals. Others deny that it is to be found in the ſtomach or inteſtines, and believe that it is abſorbed immediately from the yolk-bag. We are diſpoſed to adopt the latter opinion, both from never having being able to diſcover any yolk in the inteſtinal canal, and from a number of reaſons, which indirectly go to diſprove the paſſage of the yolk through the ductus vitello inteſtinalis.

In the firſt place, there does not ſeem to be any power by which the yolk can be tranſmitted into the inteſtine. The yolk-bag itſelf has no muſcular coat, and the mere preſſure of the parietes of the abdomen of the chick, even if ſufficiently ſtrong, would be exerted as much upon the inteſtines as the yolk-bag, and might therefore as readily urge the contents of the former into the latter, as the yolk into the gut ; for the ductus vitello inteſtinalis does not penetrate the coats of the inteſtine obliquely, ſo as to produce the effect of a valve, but has merely a ſlight contraction at the orifice, which muſt operate equally on both ſides.

There would appear to be no neceſſity for the yolk to paſs into the alimentary canal, or to be ſubjected to any proceſs of digeſtion or aſſimilation previous to its entering the ſyſtem of the chick. It is already a vital fluid, which is proved by Mr. Hunter's experiments upon the temperature of eggs. (See Egg.) If the humours of the egg did not poſſeſs vital properties, they would very ſoon become putrid from the heat of incubation.

When we contemplate the ſtructure of the yolk-bag, it muſt be perceived to be not only continuous with the inteſtinal canal, but to reſemble the latter in organization, except that the muſcular coat is wanting. The external membrane of the bag differs in no reſpect from the peritoneal coat of the inteſtines; and the internal membrane is ſo analogous to the villous coat, that we cannot heſitate to allow them the ſame functions. No advantage, therefore, would be gained by the paſſage of the yolk into the inteſtine.

The abſorption of this humour, by the valvular or internal membrane of the yolk-bag, ſeems proved by the organization of the yolk undergoing a change upon the ſurface which is in contact with the membrane, while the central part is unaltered. The circumſtance alſo, of a concrete ſubſtance, reſembling the reſidue of the albumen, being left in the yolk-bag after the nutritious parts of the yolk are conſumed, affords a ſtrong evidence that the latter are removed by a proceſs of abſorption; for if the yolk paſſed through the ductus vitello inteſtinalis, it would diſappear without diſtinction of parts.

The authors who believe that the yolk is carried into the ſyſtem without a previous preparation in the alimentary canal, attribute the office of abſorption to the red veins. In proof of this opinion Blumenbach and others ſtate that they have detected upon ſome occaſions a yellow fluid in the veins of the bag, which they have ſuppoſed to be the yolk in its paſſage. Notwithſtanding this appearance, which we have ſometimes alſo ſeen, it appears to us moſt probable that the yolk is abſorbed by the ſame ſyſtem of veſſels which take up the chyle from the ſmall inteſtines. The yolk-bag and inteſtinal canal, as already mentioned, are continuous parts, and ſimilarly organized. The yolk-bag is, in fact, a proceſs of the inteſtines, and ſhould be conſidered as a portion of the body of the chick. It is ſupplied by the ſame blood-veſſels as the inteſtines; why ſhould we therefore deny it the lacteal veſſels?

Another argument againſt the abſorbing function of the veins of the yolk-bag may be deduced from the ſize of theſe veſſels at different periods. During the early part of incubation they are large and numerous; but after the yolk-bag paſſes into the abdomen of the chick, where their abſorbing function chiefly, if not entirely, exiſts, if it does at all, they become ſmaller and fewer than the arteries. The veſſels of the yolk-bag, when they conſtitute the vaſcular area, are the organs of ſanguification for the chick. After incubation they appear to become the nutritious veſſels of the bag itſelf.

It may ſeem not eaſy to aſſign a uſe for the ductus vitello inteſtinalis, unleſs we grant it to be for tranſmitting the ſubſtance of the yolk into the alimentary canal. If, however, this ſhould not be the caſe, ſtill a communication would probably exiſt between the yolk-bag and the inteſtine; for it is without example, we believe, for the continuity to be interrupted by two adjoining cavities that have a ſimilar organization. The ductus vitello inteſtinalis we think, therefore, would exiſt as a matter of courſe, independently of any offices it might perform. We have deſcribed the purpoſes this part ſerves in the full grown bird; it is not, therefore, without its uſes.

For the hiſtory of fœtal life in oviparous animals in general, ſee Ovum.

INCUBUS, in *Medicine*, from the Latin *incubare, to lie* or *ſit upon*, the ſame with the Engliſh *night-mare*, ſignifies a ſtate of imperfect ſleep, accompanied with an oppreſſion of the breathing, and frightful dreams.

By the Greeks this affection was deſignated by a name of ſimilar import, ἐφιάλτης, *ephialtes*, from the verb ἐφάλλομαι, *I leap upon*; and it has received various other appellations expreſſive of the ſenſe of weight and oppreſſion of the cheſt, the laborious reſpiration, &c. as well as indicative of the hypotheſes by which its occurrence was explained. Thus it has been called ἐπιβολη, πνιγμὸς, *epilepſia nocturna, aſthma nocturnum*, &c.; and by Pliny, *ludibria fauni*, from the ſame notion which dictated the more modern appellations of *hag-riding, wizard-preſſing, mare-riding*; *dier mahr*, or *das reiten der mahr*, of the Germans; *cochemar* of the French; *night-mare*, &c.

This diſorder ſeizes perſons, while ſleeping, who imagine that they feel an extraordinary compreſſion or weight about the breaſt and ſtomach, which they cannot by any effort ſhake off. In this agony they ſigh, groan, and utter indiſtinct ſounds; ſometimes they cry out, but more frequently they attempt to ſpeak, or to move in vain. Theſe feelings give riſe to various frightful ſuggeſtions of the imagination: the patient fancies himſelf to be ſtruggling with ſtrong men or devils, or to be in a houſe on fire, or in danger of being drowned in the ſea or ſome river; and in attempting to run away from danger, or climb up a hill, he fancies he falls back as much after every ſtep as he had advanced before. At length the ſenſations of oppreſſion become intolerable, and the patient awakes; but the terror excited by the frightful ideas attending the night-mare, leaves often a palpitation of the heart, with great anxiety and languor, and ſometimes a tingling of the ears, and a tremor over the whole body.

It is altogether unneceſſary to attempt an enumeration of the numerous hypothetical explanations which have been attempted to be given of the phenomenon of *incubus*, and which have been detailed by Awen, Bond, and other writers. (See Awen, Poſit. inaugur. de Incubo. Argentorat. 1676. Bond, Eſſay on the Incubus or Night-mare, 1753.) The diſorder has commonly been ſuppoſed to proceed from a ſtagnation of the blood in the ſinuſes of the brain, or in the veſſels of the lungs, or from too great a quantity of blood being ſent to the head. The horizontal poſture, in time of ſleep, and the preſſure of the ſtomach upon the *aorta*, in a ſupine ſituation, have been thought ſufficient to occaſion a more than uſual diſtention of the *ſinuſes* and other veſſels of the brain; and the weight of the heart, preſſing on the left auricle and large trunks of the pulmonary veins, may, it is ſuppoſed, prevent the eaſy return of the blood from the lungs, and thus produce an oppreſſion and ſenſe of weight and ſuffocation in the breaſt. (See Bond, chap. ii.) But without entering into a particular examination of theſe opinions, which are far from being ſatisfactory, we may obſerve, with Dr. Whytt, that, if they were true, ſome degree of the night-mare ought to happen to every body that lies upon his back, eſpecially after eating a full meal. Further, if a horizontal ſituation could overcharge the brain with blood, ſo as to occaſion the *incubus*, how comes it that people, who remain for ſome time in an inverted poſture, do not feel this diſeaſe beginning to attack them? And why does a ſlighter degree of the night-mare ſometimes ſeize people who ſleep in an erect ſituation in a chair? a circumſtance which ſometimes occurs, not only after eating, but when the ſtomach is out of order, and troubled with wind. As the weight of the ſtomach, even when filled with food, can have ſcarcely any effect upon the motion of the blood in the *aorta*, ſo the preſſure of the heart is by much too ſmall to be able ſenſibly to retard the motion of that fluid in the pulmonary veins, otherwiſe, people exhauſted by tedious diſeaſes, who generally lie on their back, would be conſtantly affected with the *incubus*.

We know that certain medicines or poiſons, worms, and even corrupted bile, or other humours, by diſagreeably affecting the nerves of the ſtomach, produce an oppreſſion about the breaſt, wild imaginations, frightful dreams, raving, and inſenſibility; and there is no doubt that low ſpirits, melancholy, and diſturbed ſleep, often proceed from a diſordered ſtate of the ſtomach. It ſeems, therefore, more probable that the ſeat of the night-mare is principally in that organ. It is well aſcertained that ſome forms of epilepſy, and of hyſterical fits, originate from diſorder in that *viſcus*; and Galen conſidered the *incubus* as a nocturnal or ſlighter epilepſy. People troubled with nervous and hypochondriac affections, and who have delicate or flatulent ſtomachs, are more peculiarly ſubject to this diſorder; and it is obſerved, that a heavy or flatulent ſupper greatly aggravates the night-mare, in thoſe who are prediſpoſed to it. The ſympathy of the ſtomach with the head, heart, lungs, and diaphragm, is ſo remarkable, that there can be no difficulty in referring the ſeveral ſymptoms of the *incubus* to a diſagreeable irritation of the nerves of the ſtomach.

The *incubus* is moſt apt to ſeize perſons when lying on their back, becauſe, in this poſition, on account of the ſtomach and other abdominal viſcera preſſing more upon the diaphragm, we cannot inſpire with the ſame eaſe as when we ſit up or lie on one ſide. Further, in that ſituation of the body the food ſeems to lie heavier on the ſtomach, and wind in it does not ſeparate ſo readily by the *æſophagus* and *pylorus*, as in an erect poſture, when theſe orifices are higher than the other parts of the ſtomach. The night-mare only occurs in the time of ſleep, becauſe the ſtrange ideas excited in the mind, in conſequence of the diſordered feelings of the ſtomach, are not then corrected by the external ſenſes as they are when we are awake; nor do we, by an increaſed reſpiration or other motions of the body, endeavour to ſhake off any beginning uneaſy ſenſation about the ſtomach or breaſt. The *incubus* generally occurs in the firſt ſleep, and ſeldom towards morning, becauſe at the earlier period the ſtomach is more loaded with food, and that in a more crude and indigeſted ſtate than in the morning. A leſſer degree, amounting only to frightful dreams, is almoſt a conſtant concomitant of overloaded ſtomach in ſome habits. See DREAM.

In fact, if the night-mare were owing to a ſtagnation of the blood in the lungs from the weight of the heart, or in the ſinuſes and other veſſels of the brain from the horizontal poſture of the body, it would become greater the longer it continued, and would ſcarcely ever go off ſpontaneouſly. But we know that this diſeaſe, after affecting people for ſome time, often gradually ceaſes, and is ſucceeded by refreſhing ſleep: for as ſoon as the load of meat, or wind, or other cauſe diſagreeably affecting the nerves of the ſtomach is removed, the oppreſſion and weight on the breaſt, wild imaginations, frightful dreams, &c. vaniſh; as all theſe proceed originally from the diſorder of the ſtomach. It may be remarked, however, that, as neither flatulency, phlegm, nor crudities in the ſtomach, ever produce the ſymptoms of *hypochondriaſis*, unleſs the nerves of that organ be indiſpoſed; ſo neither a horizontal poſture, ſleep, nor heavy ſuppers, ever produce the night-mare, at leaſt in any conſiderable degree, unleſs the perſon be already prediſpoſed to the complaint, from the particular condition of the nerves of the ſtomach.

But although the ſtomach is the part commonly affected primarily in the caſe of *incubus*; yet ſymptoms like thoſe of the night-mare may ſometimes ariſe without any fault of the ſtomach, when the lungs, or even the brain, are affected. Thus Dr. Whytt obſerves, that aſthmatic patients, whoſe lungs are much obſtructed, are ſometimes diſturbed, in time of ſleep, with diſtreſſing dreams, and oppreſſed with a ſenſe of ſuffocation. Startings and oppreſſions about the præcordia, with painful dreams, are indeed common occurrences from *hydrothorax*, chronic coughs, and other pulmonary obſtructions; but they are not ſtrictly analogous to the common night-mare. Dr. Lower mentions a patient, who, though he could ſleep pretty eaſily with his head inclined forward; yet, in the oppoſite ſituation, he was always ſoon awaked with horrid dreams and tremors; the cauſe of which appeared, after his death, to have been a great quantity of water in the ventricles of the brain. At all events, a plethoric ſtate of habit, by rendering the circulation through the lungs leſs free, may help to produce, or at leaſt increaſe, the oppreſſion of the breaſt in the night-mare.

The Cure.—As incubus, then, is only a ſymptom of diſordered or loaded ſtomach, and ariſes out of the irritation and morbid feelings which are thus produced during ſleep, the relief of the diſeaſe, generally ſpeaking, lies within a narrow compaſs. *Temperance* in eating and drinking, eſpecially at late hours; taking, in fact, either extremely light ſuppers or none at all; and when the dinner is ſo late as to be only a ſupper with another name, being cautious that that alſo ſhould be moderate in quantity, and eaſily digeſtible and unſtimulating in its nature; drinking thin, ſub-acid liquors, where theſe are agreeable to the conſtitution,—theſe are the principal remedies required. Briſk active exerciſe, by which the digeſtive powers may be aided and the ſtomach ſtrengthened, is alſo adviſable. It were uſeful, too, to ſleep with high pillows, and to lie on the ſide as much as poſſible, in preference to the back. If the functions of the ſtomach are much diſordered with flatulency, heart-burn, acidity, or oppreſſion, with pain, or nauſea, after taking food, the remedies recommended for *indigeſtion* (which ſee) muſt be reſorted to. The bowels ſhould be kept open. See Whytt on Nervous Diſorders, chap. vi. § 18.

INCUMBENT, in *Law*, a clerk reſident on his benefice, with cure.

He is called incumbent of ſuch church, becauſe he ought to bend his whole ſtudy to diſcharge his cure. See RECTOR and VICAR.

INCUMBRAVIT. See QUARE *incumbravit*.

INCURABILI, the name of one of the celebrated conſervatorios or muſic-ſchools at Venice, where orphan girls, or girls of worthy parents in indigence, uſed to be well educated and regularly bred to muſic as a profeſſion. Galuppi was maſter of this conſervatorio in 1770, when the compoſition and performance were exquiſite.

INCURVATION, the act of bending a bone, or other body, from its natural ſhape.

INCURVATION *of the Rays of Light*. See LIGHT, and REFRACTION.

INCUS, in *Anatomy*, one of the ſmall bones contained in the cavity of the tympanum. See EAR.

INCUSSU, in *Geography*, a town of Africa, in the kingdom of Congo; 80 miles S. of St. Salvador.

INDAL, a town of Sweden, in the province of Medelpad;

pad, on a river of the ſame name. N. lat. 62° 34′. E. long. 16° 23′.

INDEA, a town of Africa, in the kingdom of Yemina, on a river of the ſame name.

INDEBITATUS Assumpsit, in *Law*. See Assumpsit.

INDECIMABLE, Indecimabilis, is applied to things not tithable, or which by law ought not to pay tythe.

INDEFEASIBLE, or Indefeazable, ſignifies what cannot be defeated, or made void. As, a good and indefeaſible eſtate. No one, who conſiders our laws, conſtitution, and hiſtory, without prejudice, and with any degree of attention, will aſſert, that the doctrine of hereditary right implies an indefeaſible right to the Engliſh throne. See *Right of* Crown.

INDEFINITE, Indeterminate, that which has no certain bounds, or to which the human mind cannot affix any. Des Cartes uſes the word, in his philoſophy, inſtead of infinite, both in numbers and quantities, to ſignify an inconceivable number, or number ſo great, that an unit cannot be added to it; and a quantity ſo great, as not to be capable of any addition.

Thus, he ſays, the ſtars, viſible and inviſible, are in number indefinite; and not, as the ancients held, infinite; and that quantity may be divided into an indefinite number of parts, not an infinite number.

Indefinite is alſo uſed, in the *Schools*, to ſignify a thing that has but one extreme: for inſtance, a line drawn from any point, and extended infinitely.

Thus, what they call *eternity a parte ante*, or *eternity a parte poſt*, are indefinite durations.

Indefinite, in *Grammar*, is underſtood of nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate ſenſe, and not fixed to any particular time, thing, or other circumſtance.

Indefinite *Propoſition*, in *Logic*. See Proposition.

INDELAVOY, Endelavoy, or *Indelvai*, in *Geography*, a town of Hindooſtan, in Golconda, lying in the route between the Godavery and Hydrabad; 75 miles N. of Hydrabad. N. lat. 18° 26′. E. long. 78° 40′.

INDELIBLE, formed from *delere, to blot*, with the prepoſition *in*, taken negatively, that which cannot be blotted out, or effaced.

Thus baptiſm, and the order of the prieſthood, are ſaid to convey indelible characters.

INDEMNITY, formed from the negative *in*, and *damnum*, *loſs*, in *Law*, an act by which one promiſes to guarantee, or ſave harmleſs ſome other perſon from any loſs or damage that might accrue to him on any particular account.

When a church is appropriated to an abbey, or college, the archdeacon loſeth his induction money for ever; in recompence whereof he ſhall have yearly, out of the church ſo appropriate, one or two ſhillings, more or leſs, for a penſion, as was agreed at the time of the impropriation; and this penſion is called an indemnity.

Indemnity, with regard to eſtates. See Warranty.

Indemnity. See *Act of* Grace.

INDEN, in *Geography*, a town of Switzerland, in the Valais; 18 miles E. of Sion.

INDEN-HOTUN, a town of Chineſe Tartary, the capital of the Mantchew Tartars, where they began to eſtabliſh their empire over China. N. lat. 41° 46′. E. long. 124° 36′.

INDENTATIONS *of the Coaſt of the Ocean*, in *Geology*, or the peninſulas, headlands, points, bays, gulfs, eſtuaries, &c. which occur on the ſhores of moſt iſlands and continents, are phenomena worthy the attentive conſideration of geological obſervers. M. de Luc, in his Geological Travels, vol. i. p. 333 and 336, has conſidered many of the circumſtances attending the headlands and gulfs of the northern coaſt of Europe, and very properly repreſents, that they ariſe from the ſyſtem of vallies and hills, which are ſeen inland, continuing down much below the preſent level of ſea, even to the greateſt fathomable depths in ſome inſtances: and Mr. Farey, who has remarked on this part of M. de Luc's work in the Philoſophical Magazine (vol. xxxvi. p. 7.), obſerves, that the hills all evidently ran out in headlands into the ſea, juſt as they would into a ſea at a level conſiderably above the preſent, of which a perfect idea may be obtained by tracing an extended *level* line in any country; and that the operations of the tides and waves have a powerful tendency, in moſt inſtances, to leſſen the indentations of the coaſts, by waſhing away the projecting points of hills, and throwing up the alluvial matters therefrom in the intervening gulfs, where marſhes are accumulated; and that the coaſts, where cliffs or precipices occur at the headlands only, have not originated, in moſt inſtances, from faults or depreſſions of the ſtrata under the ſea beach, but are occaſioned by the falling and waſhing away of the points of the hills. It is evident, that where rocky cliffs fringe the borders of the gulfs, as well as the headlands of a diſtrict, ſuch cliffs have a different origin from thoſe which are confined to the headlands. See Encroachment *of the Sea*.

INDENTED, Indentee, in *Heraldry*, is when the outline of a bordure, ordinary, &c. is notched, in form of the teeth of a ſaw.

Indented *Leaf*. See *Serrated* Leaf.

Indented *Line*, in *Fortification*. See Redens.

Indented *Medals and Wheel*. See Medals and Wheel.

INDENTURE, in *Law*, a writing which compriſes ſome contract between two, at leaſt; being indented at top anſwerable to another part, which has the ſame contents. See Deed.

INDEPENDENT *Company and Troop*. See Company and Troop.

INDEPENDENTS, in *Eccleſiaſtical Hiſtory*, a ſect of Proteſtants in England and Holland: ſo called, as denying not only any ſubordination among their clergy, but alſo all dependency on any other aſſembly.

They maintain, that every ſeparate church, or particular congregation, has in itſelf radically and eſſentially every thing neceſſary for its own government; that it has all eccleſiaſtical power and juriſdiction; and is not at all ſubject to other churches, or their deputies, nor to their aſſemblies, or ſynods.

Robinſon, the founder of the ſect, makes expreſs uſe of this term in explaining his doctrine relating to eccleſiaſtical government: "Cætum quemlibet particularem," (ſays he, in his Apologia, cap. 5. p. 22.) "eſſe totam, integram et perfectam eccleſiam ex ſuis partibus conſtantem, immediate et independenter (quoad alias eccleſias) ſub ipſo Chriſto." It may probably have been from this very paſſage that the title of independents was originally derived. The diſciples of Robinſon, originally called *Browniſts* (which ſee), becauſe John Robinſon, the founder of this ſect, was paſtor of a congregation of Browniſts that had ſettled at Leyden, did not reject the appellation of Independents. It was certainly utterly unknown in England before the year 1640: at leaſt it is not once mentioned in the eccleſiaſtical canons and conſtitutions that were drawn up during that year, in the ſynods or viſitations held by the archbiſhops of Canterbury, York, and other prelates, in which canons all the various ſects that then ſubſiſted in England are particularly mentioned. See Wilkins's Concilia Magnæ Britanniæ et Hiberniæ, vol. iv. cap. 5. p. 548.

It is true, that not long after this period, and more particularly from the year 1642, we find this denomination very frequently in the Engliſh annals. The Engliſh Independents were ſo far from being diſpleaſed with it, that they aſſumed it publicly in a piece, which they publiſhed in their own defence at London, in the year 1644, entitled "Apologetical Narration of the Independents." But in proceſs of time, in order to avoid the odium of ſedition and anarchy charged on this ſect, the true and genuine Independents renounced this title, and called themſelves "Congregational Brethren;" and their religious aſſemblies "congregational churches." The firſt independent, or congregational church in England, was ſet up in the year 1616, by Mr. Jacob, who had adopted the religious ſentiments of Robinſon. The Independents, though ſprung originally from a congregation of Browniſts, were much more commendable than the latter, both in the moderation of their ſentiments, and the order of their diſcipline. The Browniſts, as we have already mentioned under that article, allowed all ranks and orders of men promiſcuouſly to teach in public, and to perform the other paſtoral functions; whereas the Independents had, and ſtill have, a certain number of miniſters, for the moſt part regularly educated, choſen reſpectively by the congregations where they are fixed; nor is any perſon among them permitted to ſpeak in public, before he has ſubmitted to a proper examination of his capacity and talents, and been approved of by the congregation to which he miniſters. The charge alleged againſt them by our hiſtorian Rapin, (Hiſt. of England, vol. ii. p. 514. fol. ed.) who ſays, that they could not ſo much as endure ordinary miniſters in the church, &c. is, therefore, evidently falſe and groundleſs. He was led into his miſtake by confounding the Independents and Browniſts. There are other charges, no leſs unjuſtifiable, that have been urged againſt the Independents by this celebrated hiſtorian, and others of leſs note. Rapin ſays, that, with regard to the ſtate, they abhorred monarchy, and approved only a republican government. This might have been true with regard to ſeveral perſons among the Independents, in common with thoſe of other ſects; but it does not appear from any of their public writings that republican principles formed the diſtinguiſhing characteriſtic of this ſect. On the contrary, in a public memorial drawn up by them in 1647, they declare, that "they do not diſapprove of any form of civil government, but do freely acknowledge that a kingly government, bounded by juſt and wholeſome laws, is both allowed by God, and alſo a good accommodation unto men." The Independents, however, have been generally diſtinguiſhed by the denomination of regicides, under a notion that they were chargeable with the death of Charles I. Whether this fact be admitted or denied, and this is not a place proper for the inveſtigation of it, no concluſion can be fairly drawn from the greater prevalence of republican principles, or from violent proceedings at that period, that can affect the diſtinguiſhing tenets and conduct of the Independents in general; and eſpecially of the ſect that bears this denomination in our times. It is certain that our Independents are ſteady friends to a limited monarchy. Rapin is farther miſtaken, when he repreſents the religious principles of the Independents as contrary to thoſe of all the reſt of the world. It appears from two confeſſions of faith, one compoſed by Robinſon, on behalf of the Engliſh Independents in Holland, and publiſhed at Leyden in 1619, entitled "Apologia pro Exulibus Anglis, qui Browniſtæ vulgo appellantur," and another drawn up in London in the year 1658, by the principal member of this community in England, entitled "A Declaration of the Faith and Order owned and practiſed by the Congregational Churches in England, agreed upon and conſented unto by their Elders and Meſſengers, in their Meeting at the Savoy, Oct. 12, 1658;" as well as from other writings of the Independents, that they differed from the reſt of the reformed in no ſingle point of any conſequence, except that of eccleſiaſtical government; and their religious doctrines were almoſt entirely the ſame with thoſe that are adopted by the church of Geneva. During the adminiſtration of Cromwell the Independents acquired very conſiderable reputation and influence; and he made uſe of them as a check to the ambition of the Preſbyterians, who aimed at a very high degree of eccleſiaſtical power, and who had ſucceeded, ſoon after the elevation of Cromwell, in obtaining a parliamentary eſtabliſhment of their own church government. But after the reſtoration of Charles II. their cauſe declined; and in the year 1691, under the reign of king William, they entered into an aſſociation with the Preſbyterians reſiding in and about London, under certain heads of agreement, comprized in nine articles, that tended to the maintenance of their reſpective inſtitutions. Theſe may be found in the ſecond volume of Whiſton's Memoirs of his Life and Writings; and the ſubſtance of them in Moſheim, ubi infrà.

At this time the Independents and Preſbyterians, called from this aſſociation the United Brethren, were agreed with regard to doctrines, being generally Calviniſts, and differed only with reſpect to eccleſiaſtical diſcipline. But, at preſent, though the Engliſh Independents and Preſbyterians form two diſtinct parties of Proteſtant diſſenters, they are diſtinguiſhed by very trifling differences with regard to church government; and the denominations are more arbitrarily uſed to comprehend thoſe who differ in theological opinions. The Independents are generally more attached to the tenets diſtinguiſhed by the term orthodoxy or calviniſm, than the Preſbyterians.

Independentiſm is peculiar to Great Britain, the United States of America, where it was carried firſt in 1620, and by ſucceſſive Puritan emigrants in 1629 and 1633, from England, and the United Provinces. One Morel, in the ſixteenth century, endeavoured to introduce it into France; but it was condemned at the ſynod of Rochel, where Beza preſided; and again at the ſynod of Rochel, in 1644.

On the ſubject of this article, ſee Moſheim's Eccl. Hiſt. by Macleane, vol. v. p. 398, &c. 8vo. Neal's Hiſt. of the Puritans, vol. ii. p. 107, &c. vol. iii. p. 547, &c. vol. iv. p. 187, &c. Burnet's Hiſt. of his Own Times, vol. i. p. 46, &c.

INDERGEREE, in *Geography*, a river on the N. E. coaſt of Sumatra, which runs into the ſea. S. lat. 0° 33'. E. long. 103° 20'.

INDERGUR, a town of Hindooſtan, in Guzerat; 15 miles E. of Damaun.

INDERMAY POINT, a cape on the N. coaſt of Java. S. lat. 6° 12'. E. long. 108° 18'.

INDERSKAIA, a town of Ruſſia, on the river Ural; 72 miles N. of Gurev.

INDERSOUL, a town of Hindooſtan, in Baglana; 12 miles E. of Bahbelgong.

INDER-TAUPLITZ, a town of the duchy of Stiria, on the Enns; 14 miles W. of Rottenman.

INDERVA, a ſmall iſland in the Perſian gulf; 50 leagues W. of Ormus.

INDETERMINATE, in *Geometry*, is underſtood of a quantity either of time or place, which has no certain or definite bounds. See INDEFINITE.

INDETERMINATE *Analyſis*, is a particular branch of algebra, in which there is always propoſed a greater number of unknown quantities than there are equations; whence, from what we have ſeen under the article ALGEBRA, the queſtions become unlimited; but in this ſpecies of equations, the ſolutions muſt always be given in integers, or rational fractions; and this condition frequently fixes a limit to the number of anſwers that an equation admits of, and even ſometimes renders the problem impoſſible; though, in the generality of caſes, the number of ſolutions is indefinite. When, amongſt the unknown quantities, there are none that exceed the ſimple power, the equation is ſaid to be of the *firſt degree:* when the ſecond power enters into the equation, it is ſaid to be of the *ſecond degree:* and when the third power or cube enters, it is of the *third degree;* and ſo on.

Every indeterminate equation of the firſt degree, as

$$ax \pm by \pm cz \pm d \pm \text{&c.} = 0$$

is ſolved by means of the more ſimple equation

$$ap - bq = \pm 1.$$

And every indeterminate equation of the ſecond degree has its ſolution, if not abſolutely depending, at leaſt intimately connected with the ſolution of the equation

$$p^2 - Nq^2 = \pm 1.$$

Before, therefore, entering upon the general ſolution of indeterminate problems, it will be proper to conſider more particularly the two equations above-mentioned.

PROP. I.

To find the values of x and y, in the equation

$$ax - by = \pm 1.$$

Firſt, it may be obſerved, that this equation is always poſſible under either condition of the ambiguous ſign $\pm$, provided that a and b be prime to each other; and without this, the equation is always impoſſible; becauſe, in that caſe, the firſt ſide of the equation will be diviſible by the common diviſor of a and b; whereas the ſecond ſide, ± 1, has no diviſor; and, conſequently, no equality can obtain. But when a and b are prime to each other, the ſolution may always be obtained by the following rule: Divide the greateſt of the two given numbers a and b by the other, and then always the laſt diviſor by the laſt remainder, as in the uſual method of finding the greateſt common meaſure of two numbers, and let the ſucceſſive quotients ariſing from this operation be denoted by $\alpha, \beta, \gamma, \delta$, &c. See COMMON *Meaſure.*

With theſe quotients, placed in one horizontal row, make the following calculation; and the terms of the laſt fraction but one will be the values of x and y required; thus

$$\begin{array}{llllll} \text{quot.} & \alpha & \beta & \gamma & \delta & \text{&c.} \\ \text{frac.} & \frac{\alpha}{1}, & \frac{\alpha\beta+1}{\beta}, & \frac{(\alpha\beta+1)\gamma+\alpha}{\gamma\beta+1}, & \frac{[(\alpha\beta+1)\gamma+a]\delta}{(\gamma\beta+1)\delta+\beta} & \text{&c.} \end{array}$$

which may be otherwiſe expreſſed in words: thus, having arranged the ſucceſſive quotients, as above, the firſt fraction will have α for its numerator, and 1 for its denominator; the ſecond will have $\alpha\beta + 1$ for its numerator, and β for its denominator; and all the other numerators will be found by multiplying the numerator of the laſt fraction by the following quotient, and adding thereto the preceding numerator, and the denominators are found exactly in the ſame manner, as is evident in the foregoing fractions. See RATIO.

Ex. 1.—Find the values of x and y, in the equation

$$16x - 41y = 1.$$

```
First  16)41(2
          32
          --
           9)16(1
              9
             --
              7)9(1
                7
               --
                2)7(3
                  6
                 --
                  1)2(2
                    2
                   --
```

$$\begin{array}{llllll} \text{quotients} & 2, & 1, & 1, & 3, & 2 \\ \text{fractions} & \left\{\frac{2}{1},\right. & \frac{3}{1}, & \frac{5}{2}, & \frac{18}{7}, & \frac{41}{16} \end{array}$$

Here the laſt fraction but one is $\frac{18}{7}$, and therefore this gives the values of x and y; that is, $x = 18$ and $y = 7$, which renders $16x - 41y = 1$, as required.

Ex. 2.—Find the values of x and y, in the equation

$$17x - 15y = -1.$$

```
First  15)17(1
          15
          --
           2)15(7
             14
             --
              1)2(2
                2
               --
```

$$\begin{array}{llll} \text{Quotients} & 1, & 7, & 2 \\ \text{Fractions} & \left\{\frac{1}{1},\right. & \frac{8}{7}, & \frac{17}{15} \end{array}$$

Therefore $x = 7$, and $y = 8$, which gives

$$17x - 15y = -1.$$

The demonſtration of this rule belongs properly to continued fractions, which the reader will find very ably treated of, in the Engliſh edition of Euler's Algebra; and in moſt of the French writers on that ſubject, particularly in the "Eſſai ſur la Theorie des Nombres, par Legendre."

Having thus ſhewn the general method of ſolving the indeterminate equation $ax - by = \pm 1$; it only remains to make a few obſervations relating to it, and to ſhew, that one ſolution being obtained, an infinite number of other ſolutions may be deduced from the one known caſe.

In the above examples we found $ax - by = +1$, and $ax - by = -1$, as the queſtions required; but we are frequently led to the ſolution $ax - by = +1$, when the queſtion requires -1, and the contrary; which ſeems at firſt to deſtroy the generality of the rule; but this difficulty is eaſily ſurmounted from the following conſiderations.

Let $ap - bq = +1$, the values of p and q being known, to find, from this equation, the value of x and y, in the equation $ax - by = -1$.

Since $ap - bq = 1$, we have only to make $x = bm - p$, and $y = am - q$, and it is obvious that this ſubſtitution will give

$$a\,(bm - p) - b\,(am - q) = -1;$$

and here, by means of the indeterminate m an indefinite number of values of x and y may be determined.

If from one known caſe, as $ap - bq = +1$, the general values of x and y in the ſame equation $ax - by = +1$ were required; we ſhould only have to make $x = mb + p$, and $y = ma + q$, and we ſhould have ſtill

$$a\,(mb + p) - b\,(ma + q) = ap - bq = +1,$$

where, by means of the indeterminate m, an indefinite number of values of x and y may be obtained. We will now illuſtrate what has been taught by an example, and then proceed to the more general equations; each of which, however, will be found to depend upon the one we have been conſidering.

Ex. 3.—Find the general values of x and y, in the equation

$$13x - 19y = 1.$$

13)19(1
13
—
6)13(2
12
—
1)6(6
6
—

$$\text{Quotients} \qquad 1,\quad 2,\quad 6$$

$$\text{Fractions} \quad \left\{ \frac{1}{1},\ \frac{3}{2},\ \frac{19}{13} \right.$$

we have therefore $p = 3$, and $q = 2$; and this gives

$$13p - 19q = 1.$$

Therefore the general values of x and y are

$$x = 19m + p, \text{ and } y = 13m + q, \text{ or}$$
$$x = 19m + 3, \text{ and } y = 13m + 2.$$

Aſſuming therefore $m = 0, 1, 2, 3, 4$, &c.; we have the following values of x and y,

$$\begin{array}{lccccccc} m = & 0, & 1, & 2, & 3, & 4, & 5 & \&c. \\ x = & 3, & 22, & 41, & 60, & 79, & 98 & \&c. \\ y = & 2, & 15, & 28, & 41, & 54, & 67 & \&c. \end{array}$$

which ſeries may be continued at pleaſure.

If the propoſed equation had been $13x - 19y = -1$, then having found $p = 3$, and $q = 2$, as above; we muſt have made

$$x = 19m - 3; \text{ and } y = 13m - 2;$$

and then, by aſſuming m as before, we ſhould have

$$\begin{array}{lccccccc} m = & 0, & 1, & 2, & 3, & 4, & 5 & \&c. \\ x = & -3, & 16, & 35, & 54, & 73, & 92 & \&c. \\ y = & -2, & 11, & 24, & 37, & 50, & 63 & \&c. \end{array}$$

where it may be obſerved, that the ſucceſſive values of x and y, in both caſes, form a ſeries of arithmeticals, and may therefore be continued with great facility.

PROP. II.

To find the general values of x and y, in the equation

$$ax - by = \pm c.$$

In the firſt place we muſt have either a and b prime to each other, or if they have a common meaſure, c muſt have the ſame, for otherwiſe the equation will be impoſſible; and in this latter caſe, the whole equation may be divided by that common meaſure, and thus reduced to one in which a and b are prime to each other: it will, therefore, only be neceſſary to conſider the quantities a and b as prime to each other. Alſo, after what has been taught in the foregoing propoſition, we may always ſuppoſe that we know the caſe $ap - bq = \pm 1$; it will therefore be ſufficient in this place to ſhew how the general values of x and y, in the equation $ax - by = \pm c$, may be deduced from the known caſe $ap - bq = \pm 1$.

In the firſt place it is obvious, that ſince

$$ap - bq = \pm 1,$$

we ſhall have

$$acp - bcq = \pm c;$$

but this furniſhes only one ſolution, and in order to have the general values of x and y, we muſt ſubſtitute $x = mb \pm cp$; and $y = ma \pm cq$; which give

$$a\,(mb \pm cp) - b\,(ma \pm cq) = \pm c;$$

the ambiguous ſign $\pm$, in the two values of x and y, being $+$ when $ap - bq$ has the ſame ſign with c, but $-$ when it has a contrary one.

Ex. 1.—Find the values of x and y, in the equation

$$9x - 13y = 10.$$

Firſt, in the equation $9p - 13q = \pm 1$, we have $p = 3$, and $q = 2$, which gives $9p - 13q = +1$; and this being the ſame ſign with 10 in the propoſed equation, the general values of x and y are

$$\left\{ \begin{array}{l} x = 13m + 3c, \text{ or} \\ x = 13m + 30; \end{array} \right. \text{ and } \left\{ \begin{array}{l} y = 9m + 2c, \text{ or} \\ y = 9m + 20 \end{array} \right.$$

And by aſſuming here $m = -2, -1, 0, 1, 2$, &c. we have the following values of x and y:

$$\begin{array}{lccccccc} m = & -2, & -1, & 0, & 1, & 2, & 3 & \&c. \\ x = & 4, & 17, & 30, & 43, & 56, & 69 & \&c. \\ y = & 2, & 11, & 20, & 29, & 38, & 47 & \&c. \end{array}$$

each of which values has the required conditions, for

$$\begin{array}{c} 9 \cdot 4 - 13 \cdot 2 = 10 \\ 9 \cdot 17 - 13 \cdot 11 = 10 \\ 9 \cdot 30 - 13 \cdot 20 = 10 \\ 9 \cdot 43 - 13 \cdot 29 = 10 \\ \text{-\&c.} \qquad \text{\&c.} \qquad \text{\&c.} \end{array}$$

Ex. 2.—Find the values of x and y, in the equation

$$7x - 12y = 19.$$

Firſt in the equation $7p - 12q = -1$, we have $p = 5$, and $q = 3$; where -1 has a different ſign from 19 in the propoſed equation; therefore the general values of x and y are

$$\left\{ \begin{array}{l} x = 12m - 5 \cdot 19; \\ x = 12m - \quad 95; \end{array} \right. \text{ and } \left\{ \begin{array}{l} y = 7m - 3 \cdot 19, \text{ or} \\ y = 7m - \quad 57 \end{array} \right.$$

where, by taking $m = 9, 10, 11$, &c. in order that x and y may be poſitive, we have

$$\begin{array}{lcccccccc} x = & 13, & 25, & 37, & 49, & 61, & 73, & 85 & \&c. \\ y = & 6, & 13, & 20, & 27, & 34, & 41, & 48 & \&c. \end{array}$$

and in a ſimilar manner may any poſſible equation $ax - by = \pm c$ be reſolved.

PROP. III.

To find the general values of x and y, in the equation

$$ax + by = c.$$

In the foregoing propoſition, where the difference of two quantities was the ſubject of conſideration, we found that the number of ſolutions was infinite, provided that a and b were prime to each other; but in conſidering the ſum of two quantities, as in the preſent caſe, the number of ſolutions is always limited, and in many caſes the equation is impoſſible; it may however be demonſtrated, that the equation always admits of at leaſt one ſolution, if $c > ab - a - b$, a and b being prime to each other; and it is propoſed in the preſent propoſition to aſcertain the exact number of poſſible ſolutions that any equation of this kind admits of in integer numbers, and to point out more accurately the limits of poſſibility.

The ſolution of the equation $ax + by = c$, depends, like that in the foregoing propoſition, upon the equation $ap - bq = \pm 1$, though its connection with it is not ſo readily perceived.

Let $ap - bq = 1$; then we have alſo

$$a . cp - b . cq = c;$$

and it is evident that we ſhall have the ſame reſult if we make

$$x = cp - mb; \text{ and } y = cq - ma;$$

for this alſo gives

$$a\ (cp - mb) - b\ (cq - ma) = c:$$

aſſuming, therefore, for m ſuch a value, that $cq - ma$ may become negative, while $cp - mb$ remains poſitive, we ſhall have

$$a\ (cp - mb) + b\ (ma - cq) = c;$$

and conſequently $x = cp - mb$; and $y = ma - cq$; but if m cannot be ſo taken that $cq - ma$ may be negative, while $cp - mb$ remains poſitive; it is a proof that the propoſed equation is impoſſible in integer numbers. And on the contrary, the equation will always admit of as many integral ſolutions as there may be different values given to m, ſuch that the above conditions may obtain.

And hence we are enabled to determine *à priori* the number of ſolutions that any propoſed equation of the above form admits of; for ſince we muſt have $cp > mb$, and $cq < ma$, the number of ſolutions will always be expreſſed by the greateſt integer contained in the expreſſion $\left(\frac{cp}{b} - \frac{cq}{a}\right)$; as is evident, becauſe m muſt be leſs than the firſt of thoſe fractions, and greater than the ſecond, and therefore, the difference between the integral part of theſe fractions will expreſs the number of different values of m; except when $\frac{cp}{b}$ is a complete integer, or, which is the ſame, we muſt conſider $\frac{b}{b}$ as a fraction, and reject it, but not $\frac{a}{a}$, the reaſon for which is obvious.

Ex. 1.—Required the values of x and y, in the equation

$$9x + 13y = 2000,$$

and the number of poſſible ſolutions in integers.

Firſt, in the equation $9p - 13q = 1$, we have at once $p = 3$, and $q = 2$; therefore the number of ſolutions will be expreſſed by

$$\frac{2000 \times 3}{13} - \frac{2000 \times 2}{9} = 461 - 444 = 17.$$

And theſe are readily obtained from the formulæ

$$\begin{cases} x = cp - mb, \text{ or} \\ x = 6000 - 13m; \end{cases} \text{ and } \begin{cases} y = ma - cq, \text{ or} \\ y = 9m - 4000 \end{cases}$$

in which, aſſuming $m = 445, 446,$ &c.; in order that $9m > 4000$, we ſhall have the following ſolutions, each of which is deduced from the preceding one, by adding ſucceſſively 9 to the values of y, and ſubtracting 13 from thoſe of x; thus

$$\begin{array}{llllllll} x = 215, & 202, & 189, & 176, & 163, & 150, & 137 & \text{\&c.} \\ y = 5, & 14, & 23, & 32, & 41, & 50, & 59 & \text{\&c.} \end{array}$$

that is;

$$\begin{array}{l} 9 . 215 + 13 . 5 = 2000 \\ 9 . 202 + 13 . 14 = 2000 \\ 9 . 189 + 13 . 23 = 2000 \\ 9 . 176 + 13 . 32 = 2000 \\ \quad\text{\&c.} \qquad \text{\&c.} \qquad \text{\&c.} \end{array}$$

Ex. 2.—Given the equation $11x + 13y = 190$, to find the number of ſolutions, and the values of x and y.

Firſt in the equation $11p - 13q = 1$, we have $p = 6$, and $q = 5$; therefore

$$\frac{190 . 6}{13} - \frac{190 . 5}{11} = 87 - 86 = 1;$$

whence it follows that the equation admits of only one integral ſolution, and this is obtained from the formulæ

$$\begin{cases} x = cp - mb, \text{ or} \\ x = 190 . 6 - 13m; \end{cases} \text{ and } \begin{cases} y = ma - cq, \text{ or} \\ y = 11m - 190 . 5 \end{cases}$$

where, by taking $m = 87$, in order that $ma - cq$ may be poſitive, we have $x = 9$, and $y = 7$, which gives

$$11 . 9 + 13 . 7 = 190, \text{ as required.}$$

PROP. IV.

To find the values of x, y, and z, and the number of integral ſolutions of any equation of the form

$$ax + by + cz = d.$$

In the firſt place we may obſerve, that if any one or more of the co-efficients a, b, or c, be negative, the number of anſwers is indefinite. For let b be negative, then the equation may be put under the form

$$ax + cz = by + d;$$

in which, by means of the indeterminate y, an infinite number of values may be given to the ſecond ſide of the equation; and conſequently alſo to x and y. We need, therefore, only conſider equations of the form above given, in which the quantities are all connected with the ſign +.

Now in this equation, as in thoſe of the two foregoing propoſitions, if a, b, and c, have each a common diviſor, which d has not, it becomes impoſſible; but if only two of them, as a and b, have a common meaſure, the equation is ſtill poſſible, as we ſhall ſee in what follows.

The ſolution of the equation,

$$ax + by + cz = d,$$

is reſolved by means of the equation

$$ap - bq = \pm 1,$$

as we have ſeen is the caſe in the preceding examples. For let one of the three terms, as cz, be tranſpoſed to the other ſide of the equation; then we have

$$ax + by = d - cz,$$

in which the values of x and y, determined as in the laſt propoſition, will be

$$x = (d - cz)\,p - mb; \text{ and } y = ma - (d - cz)\,q,$$

that is, by only ſubſtituting $d - cz$ inſtead of c, which is the only reſpect in which this equation differs from that in the foregoing problem: and here the only limits to be obſerved are,

1ſt, $cz < d$; 2d, $mb < (d - cz)\,p$; 3d, $ma > (d - cz)\,q$ by attending to which, all the poſſible values of x and y

may be obtained. But as theſe queſtions generally admit of a great number of ſolutions, the object of enquiry is not ſo much to find the values of the intermediate quantities, as to determine *à priori* the number of them that the equation admits of; and this, therefore, ſhall form the ſubject of our future inveſtigation.

Now we have ſeen, that in the equation

$$ax + by = c,$$

the number of ſolutions is generally expreſſed by

$$\frac{cp}{b} - \frac{cq}{a},$$

p and q being firſt determined by the equation

$$ap - bq = 1.$$

If, therefore, in the equation

$$ax + by = d - cz,$$

we make ſucceſſively $z = 1, 2, 3, 4,$ &c. the number of ſolutions for each value of z will be as below; *viz.*

$$ax + by = d - c, \text{ number of ſolutions } \frac{(d-c)p}{b} - \frac{(d-c)q}{a}$$

$$ax + by = d - 2c \text{ . . . . } \frac{(d-2c)p}{b} - \frac{(d-2c)q}{a}$$

$$ax + by = d - 3c \text{ . . . . } \frac{(d-3c)p}{b} - \frac{(d-3c)q}{a}$$

&c. &c. &c. &c.

the ſum of which will be the total number that the given equation admits of; and therefore, in order to find the exact number of ſolutions in any equation of this kind, we muſt firſt aſcertain the ſum of all the integral parts of the arithmetical ſeries

$$\begin{cases} \frac{(d-c)p}{b} + \frac{(d-2c)p}{b} + \frac{(d-3c)p}{b} + \frac{(d-4c)p}{b} + \&\text{c; and} \\ \frac{(d-c)q}{a} + \frac{(d-2c)q}{a} + \frac{(d-3c)q}{a} + \frac{(d-4c)q}{a} + \&\text{c; and} \end{cases}$$

the difference of the two will be the exact number of intregal ſolutions.

Now in both theſe ſeries, we know the firſt and laſt term, and the number of terms; for the general term being

$$\frac{(d-cz)p}{b}, \text{ and } \frac{(d-cz)q}{a},$$

we ſhall have the extreme terms by taking the extreme limits of z, that is $z = 1$, and $z < \frac{d}{c}$; which laſt value of z alſo expreſſes the number of terms in the ſeries.

Hence then, having the elements of the progreſſions given, the ſum of the whole ſeries is readily obtained; and if therefore we alſo find the ſum of the fractional parts in each, we ſhall have, by deducting it from the whole ſums, that of the integral part of the ſeries as required. The latter part of this problem is readily effected, for the denominator in each term being conſtant, the fractions will neceſſarily recur in periods; and the number in each can never exceed the denominator: it will therefore only be neceſſary to find the ſum of the fractions in one period, which being multiplied by the number of periods, will give the ſum of the fractional part of the terms; and theſe taken from the total ſum, will give the ſum of the integral part of the ſeries; and then, from what has been before obſerved, the difference of the two ſums will be the number of integral ſolutions required. It may alſo be obſerved, that when the number of terms do not conſiſt of an exact number of periods of circulation, the remaining terms or fractions muſt be ſummed by themſelves, which is alſo readily effected, as they will be the ſame as the leading terms of the firſt period; and it muſt alſo be remembered, that $\frac{b}{b}$ is to be conſidered as a fraction in the firſt ſeries; but not $\frac{a}{a}$ in the ſecond, as is explained in the foregoing propoſition.

Ex. 1.—Given $5x + 7y + 11z = 224$, to find the number of ſolutions that the equation admits of in poſitive integers.

Here the greateſt limit of z is $z < \frac{224}{11} = 20$: alſo in the equation $5p - 7q = 1$, we have $p = 3$, and $q = 2$, alſo $a = 5$, and $b = 7$; and therefore the two ſeries, of which the ſums are required, beginning with the leaſt term in each, are

$$\begin{cases} \frac{3 \cdot 4}{7} + \frac{3 \cdot 15}{7} + \frac{3 \cdot 26}{7} + \frac{3 \cdot 37}{7} + \&\text{c. . . . } \frac{3 \cdot 113}{7} \\ \frac{2 \cdot 4}{5} + \frac{2 \cdot 15}{5} + \frac{2 \cdot 26}{5} + \frac{2 \cdot 37}{5} + \&\text{c. . , . } \frac{2 \cdot 113}{5} \end{cases}$$

the common difference in the firſt being $\frac{3 \cdot 71}{7}$; and in the ſecond $\frac{2 \cdot 11}{5}$; alſo the number of terms in each 20.

Whence we have 930 for the ſum of the firſt;
and - - 868 for the ſum of the ſecond.

Again, the firſt period of fractions, in the firſt ſeries, is

$$\frac{5}{7} + \frac{3}{7} + \frac{1}{7} + \frac{6}{7} + \frac{4}{7} + \frac{2}{7} + \frac{7}{7} = 4;$$

and in the ſecond ſeries, the firſt period of fractions is

$$\frac{3}{5} + 0 + \frac{2}{5} + \frac{4}{5} + \frac{1}{5} = 2;$$

$\frac{7}{7}$ being conſidered as a fraction in the firſt, but not $\frac{5}{5}$ in the ſecond.

Now the number of terms in each ſeries being 20, we have 2 periods and 6 terms in the firſt ſeries $= 2 \times 4 +$ the firſt 6 fractions $= 11$ for the ſum of all the fractions; and therefore $930 - 11 = 919$, which is the exact ſum of the integral terms. And in the ſecond, we have 4 periods $= 4 \cdot 2 = 8$, and therefore $868 - 8 = 860$, which is the ſum of the integral terms in this; and hence according to the rule

$$919 - 860 = 59;$$

which is the number of integral ſolutions.

Remark.—Simpſon, in his algebra, makes the number of ſolutions to this queſtion 60; but he has evidently introduced one (*viz.* $x = 10$, $y = 14$, and $z = 14$,) which does not obtain.

Ex. 2.—Having given $7x + 9y + 23z = 9999$, it is required to find the number of its ſolutions in poſitive integers.

Here the greateſt limit of $z < \frac{9999}{23} = 434$; alſo in the equation $7x - 9p = 1$, we have $p = 4$, and $q = 3$,
$a =$,

$a = 7$, and $b = 9$; alſo $9999 - 23 \cdot 434 = 17$; therefore the ſeries whoſe ſums are required, will be

$$\text{1ſt. } \frac{4 \cdot 17}{9} + \frac{4 \cdot 40}{9} + \frac{4 \cdot 63}{9} + \text{\&c.} \ldots \frac{4 \cdot 9976}{9}$$

$$\text{2d. } \frac{3 \cdot 17}{7} + \frac{3 \cdot 40}{7} + \frac{3 \cdot 63}{7} + \text{\&c.} \ldots \frac{3 \cdot 9976}{7}$$

the common difference in the firſt being $\frac{4 \cdot 23}{9} = 10\frac{2}{9}$; and in the ſecond $\frac{3 \cdot 23}{7} = 9\frac{6}{7}$: alſo the number of terms in each 434; that being the greateſt limit of z.

Hence we have the ſum of the firſt ſeries $= 963769\frac{3}{9}$

and of the ſecond - - - - 929349

Alſo the firſt period of fractions in the firſt ſeries, is

$$\frac{5}{9} + \frac{7}{9} + \frac{9}{9} + \frac{2}{9} + \frac{4}{9} + \frac{6}{9} + \frac{8}{9} + \frac{1}{9} + \frac{3}{9} = 5;$$

and $\frac{434}{9} = 48$ periods, and 2 terms $= 5 \cdot 48 + \frac{5}{9} + \frac{2}{9} = 241\frac{3}{9}$

And in the ſecond ſeries, the firſt period of fractions is

$$\frac{2}{7} + \frac{1}{7} + 0 + \frac{6}{7} + \frac{5}{7} + \frac{4}{7} + \frac{3}{7} = 3;$$

alſo $\frac{434}{7} = 62$ periods; and therefore $62 \cdot 3 = 186$.

Hence $963769\frac{3}{9} - 241\frac{3}{9} = 963528$ integral terms

and $929349 - 186 = 929163$ integral terms

whence the difference 34365 is the number of integral ſolutions required.

In the foregoing examples we have had two of the terms prime to each other; but when this is not the caſe the following transformation will be neceſſary.

Ex. 3.—Let there be propoſed the equation,

$$12x + 15y + 20z = 100001,$$

to find the number of ſolutions.

Here no two of the co-efficients are prime to each other, and we muſt therefore proceed as follows.

Divide the whole equation by 3, and tranſpoſe z, and we have

$$4x + 5y = 33334 - 7z + \frac{z - 1}{3}$$

which laſt muſt be an integer; make therefore $\frac{z - 1}{3} = u$, and we have $z = 3u + 1$; ſubſtituting now this value of z, the original equation becomes

$$12x + 15y + 20(3u + 1) = 100001;$$

or, dividing by 3,

$$4x + 5y + 20u = 33327,$$

the number of ſolutions in which will be the ſame as in the equation propoſed, which will be found as in the foregoing examples, except that here the leaſt value of $u = 0$, becauſe we ſhall then ſtill have $z = 1$, and by proceeding as in the preceding examples, it will be found that the number of integral ſolutions that may be given to this queſtion, amounts to no leſs than 1388611.

PROP. V.

Having given any number of equations, leſs than the number of unknown quantities that enter therein, to determine thoſe quantities.

Let there be propoſed the two equations

$$\begin{cases} a x + b y + c z = d \\ a' x + b' y + c' z = d' \end{cases}$$

to find the values of x, y, and z.

Multiply the firſt by a', and the ſecond by a, whence, by ſubtraction, we obtain

$$(a b - a b') y + (a' c - a c') z = a' d - a d'$$

Or, dividing each of theſe known co-efficients by their greateſt common diviſor, if they have any, and repreſenting the reſults by b'', c'', and d'', this equation becomes

$$b'' y + c'' z = d''.$$

Find now the values of y and z in this equation; and theſe being ſubſtituted for them in the equation

$$x = \frac{d - c z - b y}{a}$$

will give the correſponding values of x, of which thoſe, of courſe, muſt be rejected that render x fractional, and alſo thoſe that give $(c z + b y) > d$.

Ex.—Given the equations

$$\begin{cases} 3x + 5y + 7z = 560 \\ 9x + 25y + 49z = 2920 \end{cases}$$

to find all the integral values of x, y, and z.

Multiplying the firſt by 3, we have

$$\begin{cases} 9x + 15y + 21z = 1680 \\ 9x + 25y + 49z = 2920 \end{cases}$$

whence

$$\begin{cases} 10y + 28z = 1240, \text{ or} \\ 5y + 14z = 620 \end{cases}$$

And here the values of y and z are found to be

$$\begin{aligned} y &= 110,\ 96,\ 82,\ 68,\ 54,\ 40,\ 26,\ 12 \\ z &= 5,\ 10,\ 15,\ 20,\ 25,\ 30,\ 35,\ 40 \end{aligned}$$

and of theſe, the only two that give

$$x = \frac{560 - 7z - 5y}{3}$$

an integer, are as follows,

$$\begin{cases} z = 15,\ y = 82,\ x = 15 \\ z = 30,\ y = 40,\ x = 50 \end{cases}$$

which are the only two ſolutions the equations admit of in integers.

The method above given will never fail of producing all the poſſible ſolutions in equations of the above form; but there are other methods that may be followed in particular caſes which ſometimes ſhorten the operations. Theſe the reader will find explained in vol. ii. of Euler's Elements of Algebra.

PROP. VI.

To decompoſe a given numeral fraction, having a compoſite denominator, into a number of ſimple fractions having prime denominators.

This is, in fact, only an application of the foregoing propoſitions to this particular problem; for let $\frac{m}{n}$ be the given fraction; and ſuppoſe, in the firſt inſtance, that its denominator conſiſts of two prime factors, or $n = a\,b$, it will then be to find

$$\frac{m}{a\,b} = \frac{p}{a} + \frac{q}{b}\text{, or } a\,q + b\,p = m,$$

in which equation, having determined the values of p and q, we ſhall have $\frac{p}{a} + \frac{q}{b}$ for the fractions required; and as many different ways may any ſuch fraction be decompoſed into two others, as the equation $a\,q + b\,p = m$ admits of integral ſolutions. If the given fraction be $\frac{m}{a\,b\,c}$, then we may firſt reſolve it into two fractions, and one of theſe into two others; thus, let

$$\frac{m}{a\,b\,c} = \frac{p}{a\,b} + \frac{q}{c};$$

then we have

$$a\,b\,q + c\,p = m;$$

and having, from this equation, found the values of p and q, we ſhall have $\frac{m}{a\,b\,c} = \frac{p}{a\,b} + \frac{q}{c}$.

Again, let $\frac{p}{a\,b} = \frac{r}{a} + \frac{s}{b}$, or $a\,s + r\,b = p$, find r and s in this equation, ſo ſhall we have

$$\frac{m}{a\,b\,c} = \frac{r}{a} + \frac{s}{b} + \frac{q}{c},$$

as required; and in the ſame manner may any fraction that admits of decompoſition be reſolved into others of which the ſum ſhall be equal to the original fraction.

Ex.—What are thoſe two fractions whoſe ſum is equal to $\frac{19}{35}$.

Since $35 = 5 \times 7$, we may make $\frac{19}{35} = \frac{p}{7} + \frac{q}{5}$, which produces this equation,

$$5\,p + 7\,q = 19,$$

in which the value of $p = 1$, and $q = 2$ are readily found; and therefore the fractions ſought are $\frac{1}{7} + \frac{2}{5} = \frac{19}{35}$.

Prop. VII.

To find the leaſt number, that, being divided by given numbers, ſhall leave given remainders.

Let N repreſent the required number, ſuch that, being divided by a, a', a'' &c. the remainders ſhall be reſpectively b, b', b'', &c. that is,

$$N = a\,m + b = a'\,n + b' = a''\,p + b''\ \&c.$$

and it is required to find the leaſt value of N, that anſwers theſe conditions.

First ſince $\quad a\,m + b = a'\,n + b'$
we have $\quad a\,m - a'\,n = b' - b.$

Find, therefore, in this equation, the leaſt values of m and n by Prop. II., then will $a\,m + b$, or $a'\,n + b'$, expreſs the leaſt number that fulfils the firſt two conditions. Let now this number be called c; then it is evident that every number of the form $a\,a'\,q + c$ will alſo fulfil theſe conditions; and we muſt proceed to find $a\,a'\,q + c = a''\,p + b''$; or,

$$a\,a'\,q - a''\,p = b'' - c;$$

that is, the leaſt value of p and q in this equation; ſo ſhall we have $a\,a'\,q + c$ for the leaſt number that anſwers the firſt three conditions, and ſo on for as many others as may be propoſed.

Ex.—Find the leaſt number, that, being divided by 28, 19, and 15, ſhall leave for remainders reſpectively 19, 15, and 11.

Here we have $28\,m + 19 = 19\,n + 15 = 15\,p + 11$. Now, in the equation $28\,m - 19\,n = -4$, the leaſt values of m and n are $m = 8$, and $n = 12$; whence $28\,m + 19 = 19\,n + 15 = 243$; and it now remains to find $28 \,.\, 19\,q + 243 = 15\,p + 11$; or, $532\,q - 15\,p = -228$.

In which equation $p = 512$, and $q = 14$, whence $532\,q + 243 = 15\,p + 11 = 7691$, which is the leaſt number having the required conditions.

Having thus treated of the ſolution of indeterminate equations of the firſt degree, to as great an extent as our limit will admit of, we ſhall proceed to thoſe, in which one, at leaſt, of the unknown quantities enter in the ſquare power, which conſtitute the claſs of indeterminate equations of the ſecond degree; and as we have ſeen that every equation of the firſt claſs has its ſolution depending upon that of the equation $a\,p - b\,q = \pm 1$; ſo in thoſe that we are about to inveſtigate, the ſolution is intimately connected with that of the equation $p^2 - N\,q^2 = \pm 1$; this, therefore, is what ſhall firſt engage our attention.

Prop. VIII.

To find the integral values of p and q in the equation

$$p^2 - N\,q^2 = \pm 1,$$

N being any given number whatever, not a complete ſquare.

In order to obtain the general ſolution of this equation, which is always poſſible (at leaſt with the poſitive ſign) we muſt ſhew the method of extracting the ſquare root of any number N, not a complete ſquare, in continued fractions; but as this operation belongs properly to the latter ſubject, we ſhall only in this place indicate the method, and muſt refer the reader for the demonſtration to vol. ii. of Euler's Algebra, and to Barlow's Elementary Inveſtigations. See alſo Square Root.

The transformation of the $\sqrt{N}$, to continued fractions, is performed by means of the following formula.

Let a be the greateſt integer contained in $\sqrt{N}$; then make

$$\begin{array}{ll|rl}
\dfrac{\sqrt{N} + 0}{1} = a & & a - 0 = m; & \dfrac{N - m^2}{1} = n \\
\dfrac{\sqrt{N} + m}{n} = u & & u\,n - m = m'; & \dfrac{N - m'^2}{n} = n' \\
\dfrac{\sqrt{N} + m'}{n'} = u' & & u'\,n' - m' = m''; & \dfrac{N - m''^2}{n'} = n'' \\
\dfrac{\sqrt{N} + m''}{n''} = u'' & & u''\,n'' - m'' = m'''; & \dfrac{N - m'''^2}{n''} = n''' \\
\&c. & \&c. & \&c. & \&c.
\end{array}$$

In theſe formulæ u, u', u'', &c. are the greateſt integers contained in the correſponding fractions, which quantities are the quotients, whence the converging fractions are to be deduced, by the ſame rule as is given in Prop. I. for the quotients α, β, γ, δ, &c.; and by continuing the above operations, we ſhall be finally led to a quotient equal to $2\,a$, at which term we muſt ſtop, and the correſponding fractions to the laſt quotient before this will give the required values of p and q.

Ex. 1.—Required the values of p and q in the equation

$$p^2 - 19q^2 = -1.$$

By the above rule,

$$\begin{array}{l|l}
\frac{\surd 19 + 0}{1} = 4 = a & 4 \cdot 1 - 0 = 4\,; \ \frac{19 - 4^2}{1} = 3 \\
\frac{\surd 19 + 4}{3} = 2 = u & 3 \cdot 2 - 4 = 2\,; \ \frac{19 - 2^2}{3} = 5 \\
\frac{\surd 19 + 2}{5} = 1 = u' & 5 \cdot 1 - 2 = 3\,; \ \frac{19 - 3^2}{5} = 2 \\
\frac{\surd 19 + 3}{2} = 3 = u'' & 2 \cdot 3 - 3 = 3\,; \ \frac{19 - 3^2}{2} = 5 \\
\frac{\surd 19 + 3}{5} = 1 = u''' & 5 \cdot 1 - 3 = 2\,; \ \frac{19 - 2^2}{5} = 3 \\
\frac{\surd 19 + 2}{3} = 2 = u^{\text{iv}} & 3 \cdot 2 - 2 = 4\,; \ \frac{19 - 4^2}{3} = 1 \\
\frac{\surd 19 + 4}{1} = 8 = u^{\text{v}} & \&\text{c.} \qquad \&\text{c.}
\end{array}$$

Having thus arrived at the quotient $8 = 2a$, we have only to compute the fractions by the propoſition above quoted; thus,

$$\begin{array}{llllllll}
\text{quotients} & 4, & 2, & 1, & 3, & 1, & 2, & 8 \\
\text{fractions} \left\{ \right. & \frac{4}{1} & \frac{9}{2} & \frac{13}{3} & \frac{48}{11} & \frac{61}{14} & \frac{170}{39} &
\end{array}$$

which laſt fraction gives the values of p and q; that is, $p = 170$, and $q = 39$; for

$$170^2 - 19 \cdot 39^2 = -1, \text{ as required.}$$

Ex. 2.—Find the values of p and q in the equation

$$p^2 - 13q^2 = -1.$$

Firſt,

$$\begin{array}{l|l}
\frac{\surd 13 + 0}{1} = 3 & 3 \cdot 1 - 0 = 3\,; \ \frac{13 - 3^2}{1} = 4 \\
\frac{\surd 13 + 3}{4} = 1 & 4 \cdot 1 - 3 = 1\,; \ \frac{13 - 1^2}{4} = 3 \\
\frac{\surd 13 + 1}{3} = 1 & 3 \cdot 1 - 1 = 2\,; \ \frac{13 - 2^2}{3} = 3 \\
\frac{\surd 13 + 2}{3} = 1 & 3 \cdot 1 - 2 = 1\,; \ \frac{13 - 1^2}{3} = 4 \\
\frac{\surd 13 + 1}{4} = 1 & 4 \cdot 1 - 1 = 3\,; \ \frac{13 - 3^2}{4} = 3 \\
\frac{\surd 13 + 3}{1} = 6 & \&\text{c.} \qquad \&\text{c.}
\end{array}$$

And having thus arrived at the quotient $2a$, or 6, we have for

$$\begin{array}{llllll}
\text{quotients} & 3, & 1, & 1, & 1, & 1 \\
\text{fractions} \left\{ \right. & \frac{3}{1} & \frac{4}{1} & \frac{7}{2} & \frac{11}{3} & \frac{18}{5}
\end{array}$$

that is, $p = 18$ and $q = 5$, which give

$$18^2 - 13 \cdot 5^2 = -1,$$

as required.

Ex. 3.—Find the values of p and q in the equation

$$p^2 - 17q^2 = -1.$$

$$\text{Firſt } \frac{\surd 17 + 0}{1} = 4 = a \quad \left\{ 4 - 0 = 4 \cdot \frac{17 - 4^2}{1} = 1 \right.$$

$$\frac{\surd 17 + 4}{1} = 8$$

Here we have, at the firſt ſtep, arrived at the quotient $2a$, whence the firſt fraction, $\frac{4}{1}$, is the one ſought; for $4^2 - 17 \cdot 1^2 = -1$, as required.

Ex. 4.—Find the values of p and q in the equation

$$p^2 - 14q^2 = 1.$$

Firſt,

$$\begin{array}{l|l}
\frac{\surd 14 + 0}{1} = 3 & 3 \cdot 1 - 0 = 3\,; \ \frac{14 - 3^2}{1} = 5 \\
\frac{\surd 14 + 3}{5} = 1 & 5 \cdot 1 - 3 = 2\,; \ \frac{14 - 2^2}{5} = 2 \\
\frac{\surd 14 + 2}{2} = 2 & 2 \cdot 2 - 2 = 2\,; \ \frac{14 - 2^2}{2} = 5 \\
\frac{\surd 14 + 2}{5} = 1 & 5 \cdot 1 - 2 = 3\,; \ \frac{14 - 3^2}{5} = 1 \\
\frac{\surd 14 + 3}{1} = 6 & \quad \&\text{c.} \qquad \&\text{c.}
\end{array}$$

Whence we have,

$$\begin{array}{lllll}
\text{quotients} & 3, & 1, & 2, & 1 \\
\text{fractions} \left\{ \right. & \frac{3}{1} & \frac{4}{1} & \frac{11}{3} & \frac{15}{4}
\end{array}$$

which gives $15^2 - 14 \cdot 4^2 = 1$, as required.

It will be obſerved, that in the foregoing examples we have obtained for each only one ſolution; whereas they all admit of an indefinite number of ſolutions. Moreover, it does not appear, from the firſt three examples, how we ſhould have found the values of p and q, if they had been put equal to $+1$ inſtead of -1. This ſhall, therefore, be conſidered in the following propoſition.

Prop. IX.

To find the general values of x and y in the equation $x^2 - Ny^2 = \pm 1$, from one known caſe $p^2 - Nq^2 = \pm 1$. In the firſt place it may be demonſtrated, but our limits will not allow of it, that the equation $x^2 - Ny^2 = 1$ is always poſſible for every value of N, providing it be not a complete ſquare; and the values of x and y are always deducible, both from $p^2 - Nq^2 = 1$, and from $p^2 - Nq^2 = -1$; but if the operation above given does not produce the equation $p^2 - Nq^2 = -1$, the equation $x^2 - Ny^2 = -1$ is always impoſſible. The preſent problem, therefore, divides itſelf into three caſes; *viz.* to find the general values of x and y in the equation $x^2 - Ny^2$, under the following conditions:

1ſt, $x^2 - Ny^2 = 1$, from one known caſe $p^2 - Nq^2 = 1$
2d, $x^2 - Ny^2 = 1$, $p^2 - Nq^2 = -1$
3d, $x^2 - Ny^2 = -1$, $p^2 - Nq^2 = -1$

Caſe 1.—Reſolve $p^2 - Nq^2 = 1$, and $x^2 - Ny^2 = 1$ into the factors $\left\{ \begin{array}{l} (p + q\surd N)\,(p - q\surd N) = 1 \\ (x + y\surd N)\,(x - y\surd N) = 1 \end{array} \right.$

then we have alſo,

$$(p + q\surd N)^m\,(p - q\surd N)^m = 1;$$

equating theſe, with the factors in x and y, we have

$$\begin{aligned} (p + q\surd N)^m &= x + y\surd N \\ (p - q\surd N)^m &= x - y\surd N \end{aligned}$$

$$\text{whence } x = \frac{(p + q\surd N)^m + (p - q\surd N)^m}{2};$$

$$\text{and} \quad y = \frac{(p + q\surd N)^m - (p - q\surd N)^m}{2\surd N};$$

which values of x and y will always be integral, and will be the general values ſought; and theſe are evidently indefinite in number, becauſe the power m is indefinite.

Caſe 2.—The ſame method may be followed here, as in the preceding caſe, except that the powers muſt be even, in order to convert -1 into $+1$, as is obvious from inſpection; and, therefore, the general values of x and y will be

$$\begin{cases} x = \dfrac{(p + q\sqrt{N})^{2m} + (p - q\sqrt{N})^{2m}}{2} \\ y = \dfrac{(p + q\sqrt{N})^{2m} - (p - q\sqrt{N})^{2m}}{2\sqrt{N}} \end{cases}$$

Caſe 3.—Here, again, we have evidently the ſame reſult as in the former caſes, except that the power m muſt now be odd for every odd power of $-1 = -1$; therefore,

$$\begin{cases} x = \dfrac{(p + q\sqrt{N})^{2m+1} + (p - q\sqrt{N})^{2m+1}}{2} \\ y = \dfrac{(p + q\sqrt{N})^{2m+1} - (p - q\sqrt{N})^{2m+1}}{2\sqrt{N}} \end{cases}$$

Let us now propoſe an example in each of theſe three caſes.

Ex. 1.—In the equation $p^2 - 14q^2 = 1$, we have $p = 15$ and $q = 4$, to find a ſecond value of p and q, or of x and y, in the equation $x^2 - 14y^2 = 1$.

Make

$$\begin{cases} x = \dfrac{(15 + 4\sqrt{14})^2 - (15 - 4\sqrt{14})^2}{2} = 449 \\ y = \dfrac{(15 + 4\sqrt{14})^2 - (15 - 4\sqrt{14})^2}{2\sqrt{14}} = 120 \end{cases}$$

which give $449^2 - 14 \cdot 120^2 = 1$; and other values may be found by aſſuming any other power above the ſecond.

Ex. 2.—Given $p = 4$, and $q = 1$, in the equation $p^2 - 17q^2 = -1$, to find the values of x and y, in the equation $x^2 - 17y^2 = 1$.

Here we have, again,

$$\begin{cases} x = \dfrac{(4 + \sqrt{17})^2 + (4 - \sqrt{17})^2}{2} = 33 \\ y = \dfrac{(4 + \sqrt{17})^2 - (4 - \sqrt{17})^2}{2\sqrt{17}} = 8 \end{cases}$$

whence $33^2 - 17 \cdot 8^2 = 1$; and other values may be found by aſſuming any other even power inſtead of the ſecond.

Ex. 3.—Given $p = 4$, and $q = 1$, in the equation $p^2 - 17q^2 = 1$, to find the values of x and y, in the equation $x^2 - 17y^2 = -1$.

Aſſume

$$\begin{cases} x = \dfrac{(4 + \sqrt{17})^3 + (4 - \sqrt{17})^3}{2} = 268 \\ y = \dfrac{(4 + \sqrt{17})^3 - (4 - \sqrt{17})^3}{2\sqrt{17}} = 67 \end{cases}$$

whence, $268^2 - 17 \cdot 67^2 = -1$, and other values may be obtained, by aſſuming other odd powers inſtead of the third.

PROP. X.

To aſcertain the poſſibility or impoſſibility of every equation of the form $x^2 - Ny^2 = \pm A$; and to find x and y in the former caſe, A being $< \sqrt{N}$.

The rule for this purpoſe, is to convert $\sqrt{N}$ into a ſeries of quotients, as in Prop. VIII.; and if A be found in the denominator of any of the quotients, that is, if A be found amongſt any of the numbers, which in the propoſition above quoted are repreſented by n, n', n'', &c. the equation is poſſible, and the converging fraction correſponding to the quotient preceding this will give the values of x and y; but if A be not ſo found, then is the equation impoſſible. This theorem cannot be demonſtrated in this place, as it belongs to the theory of continued fractions, and the reader is therefore referred for a proof of the rule to Le Gendre's Eſſai ſur la Theorie des Nombres.

Ex. 1.—Required the values of x and y, in the equation

$$x^2 - 23y^2 = 2.$$

Here by the rule Prop. VIII.

$$\begin{array}{l|ll} \dfrac{\sqrt{23} + 0}{1} = 4 & 1 \cdot 4 - 0 = 4; & \dfrac{23 - 4^2}{1} = 7 \\ \dfrac{\sqrt{23} + 4}{7} = 1 & 7 \cdot 1 - 4 = 3; & \dfrac{23 - 3^2}{7} = 2 \\ \dfrac{\sqrt{23} + 1}{2} = 3 & & \end{array}$$

Having thus arrived at the denominator 2, it follows that the equation is poſſible, and the values of x and y are found from the ſame calculation as at Prop. VIII.; thus,

$$\begin{array}{lccc} \text{quotients} & 4, & 1, & 3 \\ \text{fractions} & \dfrac{4}{1}, & \dfrac{5}{1}, & \end{array}$$

whence $x = 5$, and $y = 1$, which gives $x^2 - 23y^2 = 2$.

Ex. 2.—Required the values of x and y, in the equation

$$x - 19y^2 = 5.$$

Firſt

$$\begin{array}{l|ll} \dfrac{\sqrt{19} + 0}{1} = 4 & 1 \cdot 4 - 0 = 4; & \dfrac{19 - 4^2}{1} = 3 \\ \dfrac{\sqrt{19} + 4}{3} = 2 & 3 \cdot 2 - 4 = 2; & \dfrac{19 - 2^2}{3} = 5 \\ \sqrt{19} + 2 = 1 & & \end{array}$$

Having therefore found the denominator 5, the equation is poſſible, and we have

$$\begin{array}{lccc} \text{quotients} & 4, & 2, & 1 \\ \text{fractions} & \dfrac{4}{1}, & \dfrac{9}{2}, & \end{array}$$

whence $x = 9$, and $y = 2$, which gives $9^2 - 19 \cdot a^2 = 5$, as required.

Ex. 3.—It is required to aſcertain the poſſibility, or impoſſibility, of the equations

$$\begin{cases} x^2 - 17y^2 = \pm 2 \\ x^2 - 17y^2 = \pm 3 \end{cases}$$

Firſt

$$\begin{array}{l|ll} \dfrac{\sqrt{17} + 0}{1} = 4 & 1 \cdot 4 - 0 = 4; & \dfrac{17 - 4^2}{1} = 1 \\ \dfrac{\sqrt{17} + 4}{1} = 8 & 1 \cdot 8 - 4 = 4; & \dfrac{17 - 4^2}{1} = 1 \\ \dfrac{\sqrt{17} + 4}{1} = 8 & 1 \cdot 8 - 4 = 4; & \dfrac{17 - 4^2}{1} = 1 \end{array}$$

whence it follows, that ſince only 1 enters into the denominators of theſe quotients, no one of the propoſed equations are poſſible.

Cor.—By means of this propoſition, we may demonſtrate generally the impoſſibility of all equations falling under any of the following forms;

$$\begin{aligned} x^2 - (a^2 + 1)\,y^2 &= \pm A \\ x^2 - (a^2 - 1)\,y^2 &= \pm A \\ x^2 - (a^2 + a)\,y^2 &= \pm A \\ x^2 - (a^2 - a)\,y^2 &= \pm A \end{aligned}$$

in which $A > 1$, and $< a$.

Cor. 2.—It is alſo deducible from ſimilar principles, that the following equations are always poſſible; N being a prime number, of the form placed oppoſite the reſpective equations.

$x^2 - \mathrm{N}\,y^2 = -1$ poſſible when N of the form $4n + 1$
$x^2 - \mathrm{N}\,y^2 = -2$ . . . . . . N . . . . . . $8n + 3$
$x^2 - \mathrm{N}\,y^2 = \;\;2$ . . . . . . N . . . . . . $8n - 1$

And in a ſimilar manner, are deduced the three following theorems:

1. If M and N be both of the form $4n + 3$, and not equal to each other, the equation

$$\mathrm{M}\,x^2 - \mathrm{N}\,y^2 = \pm 1$$

is always poſſible in integer numbers: that is, under one or other of the ſigns + or −.

2. If M and N be both of the form $4n + 1$; then one of the equations

$$\begin{cases} x^2 - \mathrm{M\,N}\,y^2 = -1, \text{ or} \\ \mathrm{M}\,x^2 - \mathrm{N}\,y^2 = \pm 1 \end{cases}$$

will always be reſolvible in integers.

3. If M and M′ be two prime numbers of the form $4n + 3$, and N a prime number of the form $4n + 1$, it will be always poſſible to ſatisfy one of the equations

$$\begin{cases} \mathrm{N}\,x^2 - \mathrm{M\,M'}\,y^2 = \pm 1 \\ \mathrm{M}\,x^2 - \mathrm{M'\,N}\,y^2 = \pm 1 \\ \mathrm{M'}\,x^2 - \mathrm{M\,N}\,y^2 = \pm 1 \end{cases}$$

PROP. XI.

To find the general values of x and y in the equation

$$x^2 - \mathrm{N}\,y^2 = \pm \mathrm{A}$$

from one known caſe $p^2 - \mathrm{N}\,q^2 = \pm \mathrm{A}$.

Find the values of m and n in the equation $m^2 - \mathrm{N}\,n^2 = 1$, by Prop. VIII.; then it is evident that the product

$$(p^2 - \mathrm{N}\,q^2) \times (m^2 - \mathrm{N}\,n^2) = \pm \mathrm{A};$$

and it will be found, upon the developement of the following formulæ, that

$$(p^2 - \mathrm{N}\,q^2) \times (m^2 - \mathrm{N}\,n^2) = \begin{cases} (pm + \mathrm{N}qn)^2 - \mathrm{N}\,(pn + qm)^2 \\ (pm - \mathrm{N}qn)^2 - \mathrm{N}\,(pn - qm)^2 \end{cases}$$

we have, therefore, only to make,

$$\begin{cases} x = pm + \mathrm{N}\,qn \\ y = pn + qm \end{cases} \text{ or } \begin{cases} x = pm - \mathrm{N}\,qn \\ y = pn - qm \end{cases}$$

and having before ſhewn how to find the general values m and n in the equation $m^2 - \mathrm{N}\,n^2 = 1$; it is obvious, that by means of theſe formulæ we may derive different values of x and y, in the propoſed equation, to any extent at pleaſure.

Cor.—It appears alſo from this propoſition, that if the rule in the foregoing one give $p^2 - \mathrm{N}\,q^2 = -\mathrm{A}$, when the equation propoſed be $+\mathrm{A}$; that this may be converted to the latter ſign by means of the equation

$$m^2 - \mathrm{N}\,n^2 = -1.$$

Ex. 1.—Given the values of p and q, in the equation $p^2 - 7\,q^2 = 2$; *viz.* $p = 3$, and $q = 1$, to find the general values of x and y, in the equation $x^2 - 7\,y^2 = 2$.

Firſt in the expreſſion $m^2 - 7\,n^2 = 1$, we have $m = 8$, and $n = 3$; whence by the above formulæ is obtained

$$\begin{cases} x = pm \pm \mathrm{N}\,qn = 3 \cdot 8 \pm 7 \cdot 1 \cdot 3 = 3 \text{ or } 45 \\ y = pn \pm qm \;\;\; = 3 \cdot 3 \pm 1 \cdot 8 \;\;\; = 1 \text{ or } 17 \end{cases}$$

ſo that the ſecond values of x and y are, $x = 45$, and $y = 17$; which give $45^2 - 7 \cdot 17^2 = 2$. And aſſuming theſe again as new values of p and q, other values x and y may be found *in infinitum*: or the original values of p and q may be retained, and new values found for m and n, which anſwers the ſame purpoſe.

Ex. 2.—Find the general values of x and y, in the equation $x^2 - 11\,y^2 = 5$; the known caſe being $p^2 - 11\,q^2 = 5$, or $p = 4$, and $q = 1$.

In the equation $m^2 - 11\,n^2 = 1$, we have $m = 10$, and $n = 3$, therefore by the formulæ

$$\begin{cases} x = pm \pm \mathrm{N}\,qn = 4 \cdot 10 \pm 11 \cdot 1 \cdot 3 = 7 \text{ or } 73 \\ y = pn \pm qm \;\;\; = 4 \cdot 3 \pm 1 \cdot 10 \;\;\; = 2 \text{ or } 22 \end{cases}$$

that is $x = 7$, and $y = 2$, are two new values of x and y, as are alſo $x = 73$, and $y = 22$; for each of theſe give

$$\begin{cases} 7^2 - 11 \cdot 2^2 = 5 \\ 73^2 - 11 \cdot 22^2 = 5 \end{cases}$$

and in the ſame manner, other values may be found to any required extent.

As our limits will not allow of a very full and explicit inveſtigation of the ſeveral elegant rules that have been introduced into the indeterminate analyſis by Euler, Lagrange, Legendre, and other diſtinguiſhed mathematicians; we muſt refer the reader for the inveſtigation of the methods employed in the following propoſitions to the authors abovementioned, and muſt content ourſelves with barely ſtating the operations, without entering into the demonſtration of the theorems themſelves.

PROP. XII.

Every indeterminate equation of the ſecond degree falls under the general formula

$$a\,x^2 + b\,xy + c\,y^2 + d\,x + e\,y + f = 0,$$

and this may always be transformed to the more ſimple form

$$u^2 - \mathrm{A}\,t^2 = \mathrm{B}.$$

The method of performing this transformation will be ſeen from the following partial example, and the formulæ we have given it being univerſally the ſame in all caſes.

Aſſume $bd - 2ae = g$; $d^2 - 4af = h$; $(by + d)^2 - 4a\,(cy^2 + ey + f) = t$; $b^2 - 4ac = \mathrm{A}$; $\mathrm{A}y + g = u$; $g^2 - \mathrm{A}h = \mathrm{B}$.

Then it will be found, by the developement of theſe expreſſions, that

$$a\,x^2 + b\,xy + c\,y^2 + d\,x + e\,y + f = u^2 - \mathrm{A}\,t^2 - \mathrm{B} = 0,$$

becomes $$u^2 - \mathrm{A}\,t^2 = \mathrm{B}.$$

And having found the values of u and t in this laſt equation, thoſe of x and y are readily derived in the equation propoſed.

For $$y = \frac{u - g}{\mathrm{A}}, \text{ and } x = \frac{t - d - by}{2a};$$

or, ſubſtituting for y in the laſt, we have the following values;

$$\begin{cases} y = \dfrac{u - g}{b^2 - 4ac} \\ x = \dfrac{(t - d)\,(b^2 - 4ac) - (u - g)\,b}{2a\,(b^2 - 4ac)} \end{cases}$$

Ex. 1.—Transform the equation

$$3\,x^2 + 8\,xy - 3\,y^2 + 2\,x - 5\,y = 110$$

to its ſimpleſt form.

Here $a = 3$, $b = 8$, $c = -3$, $d = 2$, $e = -5$, $f = -110$.

Whence $$\begin{cases} b^2 - 4ac = \mathrm{A} = 100 \\ bd - 2ae = g = 46 \\ d^2 - 4af = h = 1324 \\ g^2 - \mathrm{A}h = \mathrm{B} = -130284 \end{cases}$$

and thus the reduced equation becomes

$$u^2 - 100t^2 = -130284.$$

In which, having found $u = 346$, and $t = 50$,

$$\text{we have}\left\{\begin{aligned} y &= \frac{u-g}{A} = \frac{346-46}{100} = 3, \\ x &= \frac{t-by-d}{2a} = \frac{50-8 \cdot 3-2}{6} = 4, \end{aligned}\right.$$

therefore $x = 4$, and $y = 3$, are the values of x and y in the original equation.

It will be obſerved that we have employed here the moſt general form that equations of this kind admit of, and therefore the formulæ are more complex than they uſually occur in practical caſes, for when any of the co-efficients a, b, c, &c. become zero, the expreſſions are much ſimplified, as appears from the following example.

Ex. 2.—Reduce $7x^2 + 5xy + y^2 = 67$ to its ſimpleſt form.

Here $a = 7$, $b = 5$, $c = 1$, $d = 0$, $e = 0$, $f = -67$, whence, omitting thoſe quantities that are zero, we have

$$\left\{\begin{aligned} & b^2 - 4ac = A = 29; \text{ and } g = 0 \\ & d^2 - 4af = h = 1876 \\ & g^2 - Ah^2 = 29 \cdot 1876^2 = B \end{aligned}\right.$$

and thus the reduced equation is

$$u^2 - 29t^2 = 29 \cdot 1876^2.$$

And in a ſimilar manner may any indeterminate equation of the ſecond degree be reduced to the form $u^2 - At^2 = B$.

Having therefore ſhewn the method of reducing every indeterminate equation to the form $u^2 - At^2 = B$; it follows that the ſolution of this ſimple form involves with it the ſolution of every equation of this kind that can be propoſed; we ſhall therefore, in the following propoſition, attend to the ſolution of this particular caſe. But it may be proper to ſtate, that there are an infinite number of equations of this kind that are impoſſible; and will admit of no ſolution, either in integers or fractions; and therefore before we proceed farther in the inveſtigation, it will be uſeful to lay down a rule, whence their poſſibility, or impoſſibility, may be aſcertained; as we may thus frequently ſave much unneceſſary labour.

Prop. XIII.

To aſcertain the poſſibility or impoſſibility of every indeterminate equation of the ſecond degree.

Rule.—Reduce the propoſed equation to the form

$$u^2 - At^2 = B,$$

and find all the remainders ariſing from dividing each of the ſquares 1^2, 2^2, 3^2, 4^2, &c. $\left(\frac{A-1}{2}\right)^2$ by A;

and alſo the remainders ariſing from dividing each of the ſquares 1^2, 2^2, 3^2, 4^2, &c. $\left(\frac{B-1}{2}\right)^2$ by B;

and again, divide the greateſt of theſe numbers A, B, by the leaſt of them, and obſerve the remainder.

Then if B be greater than A, this laſt remainder will be found amongſt thoſe of the upper ſeries; and the number A will be found amongſt thoſe of the lower ſeries, if the equation be poſſible.

And converſely, if theſe conditions have not place, the propoſed equation will admit of no ſolution, either in integers or fractions.

Again, if $A > B$, then the remainder ariſing from $\frac{A}{B}$ will be found in the lower ſeries, and the number B in the upper ſeries of remainders, if the equation be poſſible; and if theſe conditions have not place, the propoſed equation is impoſſible.

Note.—It is to be obſerved, that equations falling under the poſſible form are not always ſolvible in integers, the proof extending only to their ſolvibility in rational numbers, which may therefore ſometimes be fractional; but when they fall under an impoſſible form, they will admit of no ſolutions either in integers or fractions.

Ex.—Required the poſſibility or impoſſibility of the equation

$$x^2 - 7y^2 = 11$$

ſquares 1^2, 2^2, 3^2 divided by 7
remainders 1, 4, 2

ſquares 1^2, 2^2, 3^2, 4^2, 5^2 divided by 11
remainders 1, 4, 9, 5, 3

$\frac{11}{7} = 1$ and remainder 4.

Now 4 is found in the upper ſeries of remainders, but 7 is not found in the lower; therefore the equation cannot have place either in integers or fractions.

And for the ſame reaſon, the equation $x^2 - 7y^2 = 11z^2$ is alſo impoſſible, for if this was poſſible, ſo would likewiſe $\frac{x^2}{z^2} - 7\frac{y^2}{z^2} = 11$; which we have ſeen is impoſſible.

Ex. 2.—It is required to aſcertain the poſſibility or impoſſibility of the equation

$$x^2 - 13y^2 = 12$$

ſquares 1^2, 2^2, 3^2, 4^2, 5^2, 6^2 divided by 13
remainders 1, 4, 9, 3, 12, 10

And the ſame ſquares, divided by 12, give for
remainders 1, 4, 9, 4, 1, 0

alſo, $\frac{13}{12} = 1$ and remainder 1.

And here, ſince 12 is found in the upper ſeries, and 1 in the lower, the equation is ſolvible.

Note.—If the equation propoſed be of the form

$$x^2 - Ay^2 = -B,$$

we muſt employ, inſtead of the poſitive remainders ariſing from A, the negative remainders of the ſame, that is, taking the quotients in exceſs. And if the equation have the form

$$x^2 + Ay^2 = B,$$

then we muſt employ the negative remainders of B. Having thus given an idea of the method of judging of the poſſibility of every equation of the form $x^2 - Ay^2 = B$; and having alſo ſhewn how any indeterminate of the ſecond degree may be reduced to this form, it only remains to ſhew the method of ſolution of the above equation; or, which is ſtill a more general form, of the equation

$$x^2 - Ag^2 = Bz^2;$$

but in this, as in the other propoſitions, we can only indicate the method, without attempting to inveſtigate the rationale of the operation; as this would carry us much beyond our limits. Now it is ſhewn under the article Diophantine, that the ſolution of the equation $x^2 - y^2 = C z^2$ is always to be obtained; and in the following propoſition, with which we ſhall conclude this article, it will be ſeen that every equation of the form $x^2 - A y^2 = B z^2$, which is poſſible, may be transformed to another of the form $x'^2 - y'^2 = c z'^2$; and that x, y, and z, in the original equation, will be dependent upon thoſe of x', y', and z', in the transformed equation; and therefore theſe laſt being known, the former will be known alſo.

Prop. XIV.

To transform every poſſible equation of the form $x^2 - A y^2 = B$, to another dependent equation of the form $x'^2 - y'^2 = c z'^2$.

Ex. 1.—It is required to transform the equation $x^2 - 5 y^2 = 11 z^2$, to another of the form $x'^2 - y'^2 = c z'^2$.

Having firſt aſcertained the poſſibility of the equation by the foregoing propoſition, the transformation may be effected in the following manner.

Aſſume $x = n y - 11 y'$, and this ſubſtituted for x, gives

$$\left(\frac{n^2 - 5}{11}\right) y^2 - 2 n y y' + 11 y'^2 = z^2.$$

Take n, ſo that $n^2 - 5$ may be diviſible by 11; that is, let $n = 4$, and our equation becomes

$$y^2 - 8 y y' + 11 y'^2 = z^2; \text{ or}$$
$$(y - 4 y')^2 - 5 y'^2 = z^2$$

or, by making $y - 4 y' = x$, we have

$$x'^2 - 5 y'^2 = z^2; \text{ or,}$$
$$x'^2 - z^2 = 5 y'^2, \text{ as required,}$$

that is, the equation has been reduced from the form $x^2 - 5 y^2 = 11 z^2$, to another of the form $x'^2 - y'^2 = c z'^2$, or, at leaſt, to $x'^2 - z^2 = 5 y'^2$; which differs from the foregoing only in the letters.

And, by means of the values of x', y', and z, in this laſt, we readily arrive at thoſe of x, y, and z, in the one propoſition;

$$\text{for } x' = y - 4 y', \text{ or } y = x' + 4 y'$$
$$\text{and } x = n y - 11 y', \text{ or } x = 4 y - 11 y'$$

Now we have ſeen, under the article Diophantine, that the general values of x' and z, in equations of the form $x'^2 - z^2 = 5 y'^2$, are

$$\begin{cases} x' = p^2 + 5 q^2 \\ z = p^2 - 5 q^2 \\ y' = 2 p q \end{cases}$$

whence we have, for the general values of x, y, and z, in the equation propoſed,

$$x = 4 p^2 + 20 q^2 + 10 p q$$
$$y = p^2 + 5 q^2 + 8 p q$$
$$z = p^2 - 5 q^2$$

where p and q may be aſſumed any numbers at pleaſure. If $p = 3$, and $q = 1$, we have $x = 86$, $y = 38$, and $z = 4$; which numbers anſwer the required conditions; for

$$86^2 - 5 \,.\, 38^2 = 11 \,.\, 4^2;$$

and by giving different values to p and q, a variety of other integral values may be found for x, y, and z.

Note.—It may happen that the firſt transformation will not reduce the equation to the form required, in which caſe we muſt again transform this anew, and, by continuing the operation, the reduction to the final form will be ultimately effected.

Ex. 2.—Required the values of x, y, and z, in the equation

$$x^2 - 12 y^2 = 13 z^2.$$

Firſt, we have $x = n y - 13 y'$, and ſubſtituting for x we have

$$\left(\frac{n^2 - 12}{13}\right) y^2 - 2 n y y' + 13 y'^2 = z^2;$$

and here $n = 5$, whence the equation becomes

$$y^2 - 10 y y' + 13 y'^2 = z^2; \text{ or}$$
$$(y - 5 y')^2 - 12 y'^2 = z^2$$

Make now $y - 5 y' = x'$, and it becomes

$$x'^2 - z^2 = 12 y'^2$$

and the general values of x' and z in this equation, are

$$x' = 3 p^2 + 4 q^2, \; z = 3 p^2 - 4 q^2, \text{ and } y' = 2 p q.$$

Whence, by aſſuming $p = 2$, and $q = 1$, we have $x' = 16$, $z = 8$, and $y' = 4$; ſo that in the original equation, the values of x, y, and z, are as follow; *viz.*

$$\left.\begin{aligned} y &= x' + 5 y' = 36 \\ x &= 5 y - 12 y' = 132 \\ z &= z \qquad\quad\;\; = 8 \end{aligned}\right\} \text{ or, } \begin{cases} y = 9 \\ x = 33 \\ z = 2 \end{cases}$$

the latter values being formed by dividing the former by their greateſt common diviſor; and either of theſe ſets of numbers anſwer the required conditions; for,

$$132^2 - 12 \,.\, 36^2 = 13 \,.\, 8^2, \text{ and } 33^2 - 12 \,.\, 9^2 = 13 \,.\, 2^2;$$

and various other values may be obtained by changing the values of p and q.

We will now give one example in which the required reduction does not take place in the firſt transformation.

Ex. 3.—Required the values of x, y, and z, in the equation

$$x^2 - 5 y^2 = 19 z^2.$$

Aſſume, as before, $x = n y - 19 y'$: then the ſubſtitution of this value for x, gives

$$\left(\frac{n^2 - 5}{19}\right) y^2 - 2 n y y' + 19 y'^2 = z^2; \text{ in which } n = 10$$

$$\text{Whence } 5 y^2 - 10 y y' + 19 y'^2 = z^2, \text{ or}$$
$$25 y^2 - 50 y y' + 95 y'^2 = 5 z$$

$$\text{Making now, } 5 y - 10 y' = x'; \text{ we have}$$
$$x'^2 - 5 y'^2 = 5 z^2$$

and here, though we have not arrived at the form required, the laſt co-efficient is reduced from 19 to 5; and thus every ſucceſſive transformation will reduce the co-efficients, till we ultimately arrive at that of unity; but without purſuing this reduction farther in the preſent caſe, we are led to the ſolution in an eaſier manner: for we ſee immediately, that x' may be aſſumed $= 5$, $y' = 2$, and $z = 1$.

And from theſe we readily aſcertain thoſe of x, y, and z, in the propoſed equation; for

$$\begin{cases} y = \dfrac{x' + n y'}{5}; \text{ or } y = \dfrac{5 + 10 \,.\, 2}{5} = 5 \\ x = n y - 19 y'; \text{ or } x = 50 - 38 = 12 \\ z = 1 \qquad\qquad\;\; ; \text{ or } z = \end{cases}$$

which give $12^2 - 5 \,.\, 5^2 = 19 \,.\, 1^2$, as required.

We ſhall now conclude this article with a ſynopſis of indeterminate formulæ; the demonſtration and application of which the reader will find in Barlow's "Elementary Inveſtigation of the Properties of Numbers."

Synopſis of Indeterminate Formulæ.

Form. 1. Equation $ax - by = \pm c$

$$\begin{cases} \text{General value of } x = mb \pm cq \\ \qquad\qquad\qquad \text{of } y = ma \pm cp \end{cases}$$

in which expreſſions m is indeterminate, and the values of p and q reſult from the ſolution of the equation $ap - bq = \pm 1$.

Form. 2. Equation $ax + by = c$

$$\begin{cases} \text{General value of } x = cq - mb \\ \qquad\qquad\qquad\qquad y = ma - cp \end{cases}$$

$$\text{Number of ſolutions} = \frac{cq}{b} - \frac{cp}{a}$$

the quantities p and q being aſcertained as above, alſo m indeterminate.

Form. 3. Equation $ax + by + cz = d$

$$\begin{cases} \text{General value of } x = (d - cz)\,q - mb \\ \qquad\qquad\qquad\qquad y = ma - (d - cz)\,p \end{cases}$$

the quantities p and q being found as above, alſo m indeterminate, and z any integer $< \frac{d}{c}$.

Form. 4. Equation $x^2 - ay^2 = z^2$.

$$\begin{cases} \text{Gen. val. of } x = p^2 + aq^2 \\ \qquad\qquad\quad y = 2pq \\ \qquad\qquad\quad z = p^2 - aq^2 \end{cases}$$

in which expreſſions a is given, and p and q are indeterminates, that may be aſſumed at pleaſure.

Form. 5. Equation $x^2 + ay^2 = z^2$.

$$\begin{cases} \text{Gen. val. of } x = p^2 - aq^2 \\ \qquad\qquad\quad y = 2pq \\ \qquad\qquad\quad z = p^2 + aq^2 \end{cases}$$

a being given, and p and q indeterminates as above.

Form. 6. Equations $ax^2 + bxy + y^2 = z^2$.

$$\begin{cases} \text{Gen. val. of } x = 2pq + bq^2 \\ \qquad\qquad\quad y = p^2 - aq^2 \\ \qquad\qquad\quad z = p^2 + bpq + aq^2, \end{cases}$$

where p and q are indeterminates, and a and b given quantities.

Form. 7. Equation $ax^2 + bx = z^2$.

$$\begin{cases} \text{Gen. val. of } x = \dfrac{bq^2}{p^2 - aq^2} \\ \qquad\qquad\quad z = \dfrac{bpq}{p^2 - aq^2}, \end{cases}$$

where a and b are known quantities, and p and q indeterminates.

Form. 8. Equation $m^2x^2 + bx + c = z^2$.

$$\begin{cases} \text{Gen. val. of } x = \dfrac{p^2 - cq^2}{bq^2 - 2mpq} \\ \qquad\qquad\quad z = \dfrac{mp^2 + mcq^2 - bpq^2}{bq^2 - 2mpq}, \end{cases}$$

where m, b, and c are any given numbers, and p and q indeterminates.

Synopſis of Indeterminate Formulæ.

Form. 9. Equation $ax^2 + bx + m^2 = z^2$.

$$\begin{cases} \text{Gen. val. of } x = \dfrac{bq^2 - 2mpq}{p^2 - aq^2} \\ \qquad\qquad\quad z = \dfrac{mp^2 + amq^2 - bpq}{p^2 - aq^2}, \end{cases}$$

where m, a, and b are known; and p and q indeterminates.

Form. 10. Equation $x^2 - Ny^2 = \pm 1$.

$$\begin{cases} \text{Gen. val. of } x = \dfrac{(p + q\sqrt{N})^m + (p - q\sqrt{N})^m}{2} \\ \qquad\qquad\quad y = \dfrac{(p + q\sqrt{N})^m - (p - q\sqrt{N})^m}{2\sqrt{N}}. \end{cases}$$

where p and q ariſe from the equation $p^2 - Nq^2 = \pm 1$, and m is indeterminate; except that it muſt be even or odd, as the caſe requires. See Prop. IX.

Form. 11. Equation $x^2 - Ny^2 = \pm A$.

$$\begin{cases} \text{Gen. val. of } x = pm \pm Nqn \\ \qquad\qquad\quad y = pn \pm qm, \end{cases}$$

the values of m and n being formed from the equation $m^2 - Nn^2 = \pm A$, and p and q from the equation $p^2 - Nq^2 = \pm 1$.

Form. 12. Equation $ax^3 + bx^2 + cx + f^2 = z^2$.

$$\begin{cases} \text{Particular val. of } x = \dfrac{c^2 - 4bf^2}{4af^2}, \\ \text{Or,} \qquad\qquad\quad x = \dfrac{(8af^4 - 4bf^2c + c^3)\,8f^2}{(4bf^2 - c)^2}, \end{cases}$$

where all the quantities a, b, c, and f are given.

Form. 13. Equation $ax^4 + bx^3 + cx^2 + dx + f^2 = z^2$.

$$\left\{ \text{Partic. val. of } x = \frac{(8bf^4 - 4cdf^2 + d^3)\,8f^2}{16c^2f^4 - 64af^6 - 8cd^2f^2 + d^4}, \right.$$

where a, b, c, &c. are all known quantities.

Form. 14. Equation $m^2x^4 + bx^3 + cx^2 + dx + e = z^2$.

$$\left\{ \text{Partic. val. of } x = \frac{16c^2m^4 - 64em^6 - 8cb^2m^2 + b^4}{(8dm^4 - 4cbm^2 + b^3)\,8m^2}, \right.$$

where alſo m, b, c, &c. are all known quantities.

Form. 15. Equation $m^2x^4 + bx^3 + cx^2 + dx + f^2 = z^2$.

$$\begin{cases} \text{Particular val. of } x = \dfrac{d^2 \pm 8mf^3 - 4cf^2}{4bf^2 \mp 4mdf}, \\ \text{Or,} \qquad\qquad\quad x = \dfrac{4m^2d \pm 4mbf}{b^2 \mp 8m^3f - 4m^2c}. \end{cases}$$

In theſe expreſſions m, b, c, &c. are known quantities, and with regard to the ambiguous ſign, it muſt be obſerved, that when it is taken + in the numerator, it muſt be − in the denominator, and the contrary.

Form. 16. Equation $ax^3 + bx^2 + cx + f^3 = z^3$.

$$\left\{ \text{Particular val. of } x = \frac{(c^2 - 3bf^2)\,9f^3}{27af^6 - c^3}, \right.$$

a, b, c, &c. being known quantities.

Synopſis of Indeterminate Formulæ.

Form. 17. Equation $m^3 x^3 + b x^2 + c x + d = z^3$.

$$\left\{ \text{Particular val. of } x = \frac{b^3 - 27 d m^6}{(3 c m^3 - b^2) 9 m^3}, \right.$$

a, b, c, &c. being given quantities, as above.

Form. 18. Equation $m^3 x^3 + b x^2 + c x + f^3 = z^3$.

$$\left\{ \begin{array}{ll} \text{Particular val. of } x = & \dfrac{(c^2 - 3 b f^3) 9 f^3}{27 m^3 f^6 - c^3}, \\ \text{Or,} \qquad x = & \dfrac{b^3 - 27 f^3 m^6}{(3 c m^3 - b^2) 9 m^3}, \\ \text{Or,} \qquad x = & \dfrac{3 m f^2 - c}{b - 3 m f}, \end{array} \right.$$

where alſo m, b, c, &c. are known quantities.

Form. 19. Equation $x^2 + a x y + b y^2 = z^3$.

$$\left\{ \begin{array}{l} \text{General val. of } x = t^3 - b t u^2 - a b u^3 \\ y = 3 t^2 u + 3 a t u^2 + (a^2 - b) u^3 \\ z = t^2 + a t u + u^2, \end{array} \right.$$

where t and u may be aſſumed at pleaſure.

Form. 20. Equation $x^2 + b y^2 = z^3$.

$$\left\{ \begin{array}{l} \text{Gen. val. of } x = t^3 - b t u^2 \\ y = 3 t^2 u - b u^3 \\ z = t^2 + u^2, \end{array} \right.$$

t and u being indeterminates, as above.

Form. 21. Equation $x^2 + b y^2 = z^4$.

$$\left\{ \begin{array}{l} \text{Gen. val. of } x = t^4 - 6 b t^2 u^2 + b^2 u^4 \\ y = 4 t^3 u - 4 b t u^3 \\ z = t^2 + b u^2, \end{array} \right.$$

t and u being indeterminates, as above.

Form. 22. Equation $x^2 + b y^2 = z^m$.

$$\left\{ \begin{array}{l} \text{Gen. val. of } x = t^m - \beta t^{m-2} u^2 b + \delta t^{m-4} u^4 b^2 - \text{\&c.} \\ y = \alpha t^{m-1} u - \gamma t^{m-3} u^3 b + \epsilon t^{m-5} u^5 b^2 \text{\&c.} \\ z = t^2 + b u^2, \end{array} \right.$$

where t and u are indeterminates, and 1, α, β, γ, δ, &c. the co-efficients of $(t + u)^m$.

Form. 23. Equation $x^3 + c y^3 = z^2$.

$$\left\{ \begin{array}{l} \text{Gen. val. of } x = 4 t^4 - 4 c t u^3 \\ y = 8 t^3 u + c u^4 \\ z = t^3 + c u^3, \end{array} \right.$$

where t and u are indeterminates.

Form. 24. Equation $x^3 + a x^2 y + b x y^2 + c y^3 = z^2$.

$$\left\{ \text{Partic. val. of } t = - \frac{u^2 + 2 a u w + (a^2 - b) w^2}{2 w}. \right.$$

$$\left\{ \begin{array}{l} \text{Gen. val. of } x = t^2 + 2 c u w + a c w^2 \\ y = 2 t u - 2 b u w - (a b - c) w^2, \end{array} \right.$$

where u and w are indeterminates, on which alſo depends the value of t

Indeterminate *Problem*, is that in which there are more unknown quantities than there are equations; and therefore from the principles of algebra the number of ſolutions is unlimited, unleſs ſome other condition enter, ſuch as requiring integral values of the unknown quantities, by which means the problem frequently admits of only a definite number of anſwers; as may be ſeen in the preceding article. In geometry a problem is always ſaid to be indeterminate, or unlimited, when there are not ſufficient data to limit its conſtruction.

INDEX, in *Anatomy*, the fore-finger.

Index, in *Arithmetic*, is the ſame with what is otherwiſe called the characteriſtic, or exponent of a logarithm.

The index is that which ſhews of how many places the abſolute number belonging to the logarithm conſiſts, and of what nature it is, whether an integer, or a fraction.

Thus, in this logarithm 2.521293, the number ſtanding on the left hand of the point is called the index; and becauſe it is 2, it ſhews you that the abſolute number anſwering to it conſiſts of three places; for it is always one more than the index, becauſe the index of 1 is 0; of 10 is 1; and of 100 is 2, &c. And, therefore, in thoſe ſmall tables of Briggs's Logarithms, where the index is omitted, it muſt be always ſupplied before you can work by them. If the abſolute number be a fraction, the index of the logarithm has a negative ſign, and is marked thus, $\bar{2}.562293$: which ſhews the correſponding number to be a decimal fraction of three places; *viz.* 1.365.

Mr. Townly has a peculiar way of noting theſe indices, when they expreſs fractions, now much in uſe, *viz.* by taking, inſtead of the true index, its arithmetical complement to 10; ſo that he would write the logarithm now mentioned thus: $\bar{8}.562293$.

How indices are to be added and ſubtracted, ſee under the article Logarithm.

Index, in *Muſic*, a character uſually placed at the end of each line to indicate the firſt note of the next line. The following is the character W, which the Italians term a *moſtra*, the Engliſh call it a *direct*.

Index *of a Book*, is that part annexed to a book, referring to the particular matters or paſſages therein contained.

Index *of a Globe*, is a little ſtyle fitted on to the north-pole, and turning round with it, pointing to certain diviſions in the hour-circle.

It is ſometimes alſo called *gnomon*. See Globe.

Index *of Relation*, in *Algebra*, the ſame with ſcale of relation. See Scale.

Index, or *Indice*, is alſo the denomination of a congregation at Rome, whoſe buſineſs is to examine books, and to put ſuch as they think fit to prohibit the reading and ſelling of, into an index. See Congregation.

Indices, or *Expurgatory Indices*, denote the name by which the catalogues of prohibited books are called; among which, however, there is this difference, that ſome are condemned purely and abſolutely, and others only *donec corrigantur*, till they be corrected.

Father Paul ſays, that Philip of Spain was the firſt who, by a law made in 1558, procured an index to be publiſhed of the books condemned by the inquiſition of Spain. Pope Paul IV. took the hint, and ordered the congregation of the holy office at Rome to print a ſecond in 1559. But Gretſer, (De Jure Prohib. lib. ii. cap. 19.) ſays, that the index of prohibited books was printed in Italy, by the papal authority, in 1548; and a larger one in 1552; and another larger in 1554. Pius IV. recommended the matter to the council of Trent; the fathers at Trent, after ſeveral debates not being able to agree, thought fit to refer the whole affair to the pope, who, with the advice of certain learned prelates, publiſhed an index of the prohibited books, and certain rules, by his letters, in form of a brief. The ſame Pius IV. in a bull of March 24, 1564, ſays, that the index was preſented to him by order of the ſynod, that it ſhould not be publiſhed before it was approved by him. It was accordingly publiſhed by him, with a ſtrict charge that it ſhould be received by all, and the rules prefixed to it obſerved. Clement VIII. enlarged and confirmed it, together with the rules, and commanded it to be publiſhed in 1595. This was called by the name of the Roman index. By the fourth rule, the common reading of the Holy Scriptures is forbid in theſe words. "Since it is plain by experience, that if the ſacred writings are permitted every where, and without difference to be read in the vulgar tongue, men, through their raſhneſs, will receive more harm than good; let the biſhop or inquiſitor determine, with the advice of the pariſh prieſt or confeſſor, to whom to permit the reading of the bible, tranſlated by Catholic authors in the vulgar tongue, according as they ſhall judge whether it be moſt likely that ſuch reading of the ſcripture may do harm, or tend to the increaſe of faith and piety. Let them alſo have the ſame power as to all other writings. But if any, without ſuch leave, ſhall preſume to read or have them, without firſt ſhewing the bible to the ordinaries, he ſhall not receive the abſolution of his ſins. And as to all bookſellers, who ſhall ſell the bibles tranſlated into the vulgar tongue, without ſuch leave, or by any other method ſhall publiſh them, let them forfeit the price of the books, and let the money be given to pious uſes by the biſhop; and let them be ſubject to other puniſhments; at the pleaſure of the ſaid biſhop, according to the nature of the offence. As to regulars, they ſhall not read or buy them, without leave firſt obtained from their prelates." The tenth rule enjoins ſeveral reſtrictive regulations concerning the printing and publication of books. Hardouin's Concil. tom. x. p. 207, &c.

In pope Clement's catalogue is an extraordinary kind of decree, that all the books of Catholic authors, written ſince the year 1515, which was the year immediately preceding that in which Luther began to declaim againſt indulgences, ſhould be corrected; not only by retrenching what is not conformable to the doctrine of Rome, but alſo by adding what may be judged proper by the correctors.

After this, the duke of Alva procured another to be printed at Antwerp in 1571, which was publiſhed by Francis Junius about the year 1586. There were two others publiſhed in 1584, and 1612, by the cardinals Quiroga and Sandoval, and ſeveral others by the inquiſitors and maſters of the ſacred palace. The moſt conſiderable of all the indices is that of Anthony a Sotomayor, ſupreme preſident and inquiſitor-general in the kingdom of Spain, which was made for all the ſtates ſubject to the king of Spain, and comprehends all the others. This was publiſhed, with the advice of the ſupreme ſenate of the general inquiſition, in 1640, and reprinted at Geneva in 1667. To this there were many rules prefixed; and to the Geneva edition was added the index of the decrees which were made by the maſter of the holy palace, by virtue of his office, or by the command of the holy congregation, or by the holy congregations for the indices and holy office, after the before-mentioned index of the council of Trent. The rules of the former indices are explained and confirmed by theſe; and the fifth rule, which enlarges the fourth of the index of Trent, prohibits not only all bibles in the vulgar tongue, comprehending all except thoſe that are Hebrew, Greek, Latin, Chaldee, Syriac, Ethiopic, Perſic, and Arabic; but all parts of them, either printed or manuſcript, with all ſummaries and abridgments in the vulgar language or tongue. Limborch's Hiſt. of the Inquiſition by Chandler, book ii. chap. 16.

Of the operation of theſe indices, the authors of the Encyclopædia obſerve, that there has been hardly any good book of piety or morality in their language which has not been proſcribed. Art. *Index.*

Index *of the variation and of the inequability of curvature.* See Variation *of curvature.*

INDGEH, in *Geography*, a town of Aſiatic Turkey, in Caramania; 12 miles S.W. of Kaiſarieh.

Indgeh *Su*, a town of Aſiatic Turkey, in Natolia; 40 miles S.W. of Angura.

INDIA, an extenſive country of Aſia, which was divided by Ptolemy and the ancient geographers into "India extra Gangem" and "India intra Gangem," or the peninſula beyond the Ganges and that on this ſide of the Ganges, to which the appellation of India, according to its original etymology, as the country of the people called "Hindoos," properly belongs. (See Hindoostan.) India on this ſide of the Ganges was bounded, according to Ptolemy, on the W. by the Paropamiſus, Arachoſia, and Gedroſia; on the N. by mount Imaus; on the E. by the Ganges; and on the S. and partly on the W. by the Indian ſea. The gulf into which the Indus diſcharged itſelf was called "Canthi-Colpus," and an iſland in this gulf was named "Barace." The weſtern mouth of the Indus was denominated "Sagapa." Ptolemy enumerates ſeven mouths of this river under this and the following names; *viz.* "Oſtium Sinthum, Oreum, Chariphi, Saparages, Sabalaſſa, and Lonibare." To the Ganges Ptolemy aſſigns five mouths, *viz.* thoſe of "Polura, Oſtium Magnum, O. Chambericum, O. Pſeudo-ſtomum, and Antibole." The part of India, which was ſituated towards the weſt, was called "Indo-Scythia." India beyond the Ganges had the Ganges on the W., on the N. certain parts of Scythia and Serica; on the E. the country of the Sinæ; and to the S. the Indian ſea. This, however, is a vague name for wide and various, and till of late very much unknown, regions between Hindooſtan and China. The territory thus denominated is rich and extenſive, and includes the Birman empire, and the dominions of Pegu, Siam, Laos, Cambodia, Siampa, Cochinchina, Tonquin, and Malacca: which ſee reſpectively. See alſo Arracan, Asam, Ava, and Thibet. For an account of "Hither India," or "India intra Ganges," ſee Hindoostan and *Eaſt India* Company. For an elaborate account of the "Political Hiſtory of India, from the introduction of Mr. Pitt's bill, A. D. 1784, to the preſent date," ſee Mr. Malcolm's "Sketch." Lond. 1811, 8vo.

India, *Eaſt, Company, Coins, Silk,* &c. See Company, Coin, Silk, &c.

India, Sigismondo d', in *Biography*, a muſical compoſer, who was born at Palermo in Sicily, and flouriſhed about the year 1610. In 1611 he publiſhed at Venice two ſets of madrigals; and in 1627 a book of motetti, which did not go down the ſtream of oblivion unnoticed.

INDIAN, in a general ſenſe, denotes any thing belonging to the Indies, Eaſt or Weſt.

Indian *Arrow root*, in *Botany*. See Maranta.

Indian *Bay*, in *Geography*, a bay that lies on the W. ſide of Bonaviſta bay, in Newfoundland.

Indian *Bread*, in *Botany*. See Cassada.

Indian *Corn*. See Maize.

Indian *Corn-ears, Petrified*, in *Natural Hiſtory*. Many of the early writers on extraneous foſſils mention ears of Indian corn among their reliquia. Mr. James Parkinſon, in his Organic Remains, vol. i. p. 450, ſhews, that what Emanuel

Swedenborg figured as an ear of Indian corn, is the ſtem of an unknown plant, which, at pages 424 and 427, is ſaid to belong to the ſeries of vegetable remains incloſed in iron-ſtone nodules. See plate 14. fig. 4. of W. Martin's Pet. Derb.

Indian *Cove*, in *Geography*, a harbour on the E. coaſt of Indian iſland, in Duſky bay.

Indian *Creek*, a creek on the iſland of Antigua, a little to the weſt of Standfaſt point.—Alſo, a river of Virginia, which runs into the Ohio, N. lat. 40° 25′. W. long. 80° 40′.—Alſo, a river of Virginia, which runs into the Cheſapeak, N. lat. 37° 43′. W. long. 76° 27′.

Indian *Creſs*, in *Botany*. See Tropæolum.

Indian *Corn Falls*, in *Geography*, a cataract in the river St. Mary, about twenty miles from lake Superior. N. lat. 46° 22′. W. long. 84° 25′.

Indian *Fig*, in *Botany*. See Cactus.

Indian *Gem*, in *Mineralogy*. See Gem.

Indian *God-tree*, in *Botany*. See Ficus.

Indian *Head*, in *Geography*, a cape on the E. coaſt of New Holland, ſo called by captain Cook from the number of natives who appeared near it as he paſſed in May 1770. S. lat. 25° 3′. E. long. 123° 56′.

Indian *Iſland*, a ſmall iſland near the coaſt of North Carolina, at the mouth of Pamlico ſound. N. lat. 35° 23′. W. long. 76° 50′.—Alſo, an iſland on the S. part of Duſky bay, on the coaſt of New Zealand, about four miles in circumference, ſo called by captain Cook; about four miles from Pickerſgill harbour.

Indian *Ink*. See Ink.

Indian *Leaf*, *Malabathrum*, in *Botany*. See Tamalapatra.

Indian *Mallow*. See Sida.

Indian *Millet*. See Holcus.

Indian *Oak*. See Tectona.

Indian *Ocean*, in *Geography*. See Ocean.

Indian *Old Town*, a town of America, in Hancock county, ſtate of Maine, ſituated on an iſland in Penobſcot river, juſt above the Great Falls, and about ſixty miles below the Forks. Here are about 100 families of Roman Catholics, the remains of the Penobſcot tribe, and the only Indians who reſide in the diſtrict of Maine. They are in a thriving ſtate, having obtained from the Provincial congreſs a tract of land, 12 miles wide, interſected in the middle by the river, and veſted with a right of hunting and fiſhing as far as the mouth of Penobſcot bay extends. They have a decent church, and a prieſt who conducts their religious ſervice.

Indian *Reed* and *Shot*, in *Botany*. See Canna.

Indian *River*, in *Geography*, a river of Delaware, which runs into Rehobot bay, N. lat. 38° 40′. W. long. 75° 16′.—Alſo, a ſmall arm of the ſea, between Chandlin and Pleaſant river, in the diſtrict of Maine.—Alſo, a river on the E. coaſt of the peninſula of Eaſt Florida, riſing near the ſea-coaſt, and running from north to ſouth, and forming a kind of inland paſſage along the coaſt. It is alſo called Rio Ays. N. lat. 27° 30′. W. long. 80° 40′.—Alſo, a town in Suſſex county, Delaware, containing 1547 inhabitants.

Indian *Sound*, a gulf or bay on the S. coaſt of Patagonia, communicating with the Straits of Magellan by St. Jerome's channel.

Indian *Town*, a ſmall town of North Carolina, 52 miles from Edenton.

Indian *Town Point*, a cape on the eaſt coaſt of the iſland of Antigua. N. lat. 17° 15′. E. long. 61° 22′.

Indian *Wood*, called alſo *Jamaica* and *Campeachy Wood*, is taken out of the heart of a large tree growing plentifully in the iſles of Jamaica, Campeachy, &c. uſed in dyeing, its decoction being very red.

It has been obſerved, that putting ſome of this decoction into two bottles, and mixing a little powder of alum with the one, it will become of a very beautiful red, which will hold; the other in a day's time becoming yellow, though both bottles were ſtopped from the air alike; and that if a little of the ſame decoction be expoſed to the air, it will become as black as ink in the ſame ſpace of time. See Campeachy *Wood*, Brasil, and Logwood.

INDIANA, in *Geography*, a territory on the N.W. ſide of the Ohio, and lately formed a part of the N. W. territory. In January 1801, it was by act of congreſs erected into a temporary government, with powers and privileges ſimilar to other territorial governments. It lies between the Great Miami river E., the Miſſiſſippi W., the Ohio S., and the Illinois N. It is divided into the three following counties:

Counties.	Inhabitants.	Chief Towns.	Inhabitants.
Knox	2517	St. Vincennes	714
Randolph	1103	Kaſkakias	467
St. Clair	1255	Kakokia	719
Total	4875		

This territory has a fine ſoil, adapted to corn, wheat, rye, oats, cotton, hemp, tobacco, &c. The two weſtern counties of Randolph and St. Clair have lately petitioned congreſs to be annexed to the Upper Louiſiana, in the territorial government. On the N. W. bank of the Ohio, about twenty miles ſouthward of the mouth of the Wabaſh, N. lat. 37° 36′, is a remarkable cave, called the "Great Cave," which is one of the moſt ſurpriſing natural curioſities on the Ohio. The entrance is ſpacious and uniform; the dome is elliptical, and the uniformity continues to its termination in the hill. Morſe.

Indiana, a territory in Virginia, lying between Ohio river and the Laurel mountain, containing about 3½ millions of acres; of a form nearly triangular, and extending in length from the Pennſylvania line to the waters of the Little Kenhaway.

Indiana, a new county in the weſtern parts of Pennſylvania, which, with Weſtmoreland and Armſtrong, conſtitute a diſtrict for the choice of three repreſentatives.

INDIANE, a ſmall harbour in the iſland of Cape Breton.

INDIANS, the name given to the aborigines of America. Theſe people are ſcattered through the vaſt extent of the two prodigious continents, and divided into an infinite number of nations and tribes, differing from each other but little in their manners and cuſtoms. The Indians are tall and ſtraight in their limbs: their bodies are ſtrong, and adapted to endure much hardſhip. Their features are regular, but their countenances fierce; their hair long and lank, and the colour of their ſkins a reddiſh brown. Their only occupations are hunting and war; agriculture is left to the women, and for merchandize they have no taſte. They are hoſpitable, generous, and good-tempered; but to the enemies of their country they are implacable: no length of time can allay their reſentment, nor is any diſtance of place great enough to protect the object of their revenge. The Indians ſeem to have no juſt notion of a Supreme Being, though they maintain the exiſtence of ſuch a Being, eternal and incorruptible, who has power over all, to whom however they pay no worſhip: but they are exceedingly ſuperſtitious; and being deſirous to look into futurity, they encourage and ſupport a multitude of diviners, augurs, and magicians, upon whoſe deciſions and advice they rely in all matters that concern them, whether of health, war, or hunting. Liberty is the darling paſſion of the Indians; it is this which makes life ſupportable, and to this they are ready to ſacrifice every thing. Some tribes acknowledge a head or king, but he is reverenced as a father rather than feared as a monarch. He has no guards, no priſons, no officers of juſtice: in moſt caſes no other qualification is neceſſary for their chiefs, but age, experience, and ability in conducting their affairs. Every tranſaction is performed with much ceremony; and to fix the remembrance of them in their minds, they have belts of ſmall ſhells or beads of different colours, which have all a different meaning, according to their colour or arrangement. Theſe belts are carefully treaſured up in each town, and ſerve as the public records of the nation; and to theſe they occaſionally have recourſe when any diſputes happen between them and their neighbours.

When the ancients among the Indians have reſolved upon a war, they do not declare what nation they mean to attack, nor the time when the attack ſhall be made, in order that the enemy may be off his guard, and unprepared for defence: but the principal captain ſummons the youths of the town to which he belongs, the war-kettle is ſet on the fire, the war-ſongs and dances begin; the hatchet is ſent to all the villages of the ſame nation, and to all its allies; the fire catches, and the war-ſongs are heard in all parts. The prime qualities in an Indian war are vigilance and attention, to give and avoid ſurprize: likewiſe patience and ſtrength to endure the intolerable fatigues and hardſhips which always attend it. The fate of their priſoners is the moſt ſevere of all: during the greateſt part of their journey homewards they ſuffer no injury; but when they arrive at the territories of the conquering ſtate, or at thoſe of their allies, the people from every village meet them, and think that they ſhow their attachment to their friends by their barbarous treatment of the priſoners. Many writers have aſſerted that the Indians, even at the matureſt ſtage of their exiſtence, are only furniſhed with hair on their heads, and that the other parts of the body are always free from it. This, however, is not the truth, for, naturally, their bodies reſemble thoſe of the Europeans; but regarding the beard, &c. as deformities, they pluck out each hair by its root, in order to increaſe their beauty. The men of every Indian nation differ in dreſs from each other, excepting thoſe who trade with Europeans; theſe exchange their furs for blankets, ſhirts, and other apparel, which they wear as much for ornament as neceſſity. Thoſe among the men who wiſh to appear gayer than the reſt, pluck out the hair from their heads, except from a ſpot on the top of it, about the ſize of a crown piece, where it is permitted to grow to a conſiderable length: on this is faſtened a plume of feathers of various colours, with ſilver or ivory quills. The manner of cutting and ornamenting this part of the head diſtinguiſhes different nations from each other. They paint their faces red and black, and their whole bodies when they go to war. Young Indians, who are deſirous of excelling their companions in finery, ſlit the outward rim of both ears, at the ſame time that they take care not to ſeparate them entirely, but leave the place thus cut ſtill untouched at both extremities; around this ſpongy ſubſtance they twiſt braſs wire, till the weight draws the amputated rim into a bow of five or ſix inches in diameter, and drags it almoſt down to the ſhoulder. It is alſo a common cuſtom among them to bore their noſes, and wear in them pendants of different ſorts: ſea ſhells are much worn by thoſe of the interior, and are reckoned ornamental. Indians in general pay greater attention to their dreſs, and to the ornaments with which they decorate their perſons, than to the accommodation of their huts or tents. They conſtruct the latter in the following method: being provided with poles of a proper length, they faſten two of them acroſs near the ends with bands made of bark: having done this, they raiſe them up, and extend the bottom of each as wide as they purpoſe to make the area of the tent: they then erect others of an equal height, and fix them ſo as to ſupport the two principal ones: over the top they ſpread the ſkins of beaſts. Theſe tents have neither chimnies nor windows; there is only an aperture left in the middle of the roof, through which the ſmoke is diſcharged. They have ſkins alſo for beds, generally thoſe of the bear, which are placed in rows on the ground; and if the floor is not large enough to contain beds ſufficient for the accommodation of the whole family, a frame is erected a few feet from the ground, in which the younger part of it ſleep. As the habitations of the Indians are thus rude, their domeſtic utenſils are few in number, and plain in their formation. The tools with which they faſhion them are ſo awkward and defective, that it is not only impoſſible to form them with any degree of neatneſs, but the time required in the execution is ſo conſiderable, as to deter them from engaging in the manufacture of thoſe which are not abſolutely neceſſary. All the tribes are now poſſeſſed of knives, and ſteels to ſtrike fire with: theſe are regarded as eſſential to the common uſes of life, and the Indians uſually purchaſe them with ſlaves. Indians, by a ſurpriſing ſagacity, will croſs a foreſt or plain of the greateſt extent, and reach with the utmoſt exactneſs the place of their deſtination without any deviation from a direct line. Their memory is very tenacious, their belts of wampum preſerve the ſubſtance of treaties which they have concluded with the neighbouring tribes for ages back, to which they will appeal with as much readineſs and perſpicuity as Europeans can to their written records. Every nation pays great reſpect to the dictates of age. The advice of a father is regarded: but the deciſions of a grandfather create in the minds of the young an awe which they cannot withſtand: his words are conſidered and obeyed as oracles. The Indians are fond of gaming, and often ſtake their arms, their apparel, and every thing of which they are poſſeſſed: they are ſtrangers to all diſtinction of property, except in articles of domeſtic uſe, which every one conſiders as his own, and increaſes as circumſtances admit. They are extremely liberal to each other, and ſupply the exigencies of thoſe who belong to the ſame band with their ſuperfluities. Of the value of money the Indians, excepting thoſe who live near the European colonies, have no idea, but conſider it as a ſource of innumerable evils. They are equally indifferent to the productions of art. They are ignorant of the ſciences, and ſeem quite unacquainted with the firſt principles of aſtronomy, yet they contrive to divide the time in a rational and perſpicuous manner. They count their years by winters, or, as they expreſs themſelves, by their ſnows; and they divide the years by the moons; and on the firſt appearance of each new moon they repeat ſome joyful ſounds, ſtretching, at the ſame time, their hands towards it. Every month has with them a name expreſſive of its ſeaſon: that which anſwers to our March or April, they call the *worm* month, becauſe they obſerve that at this period the worms quit their retreats in the bark of trees, wood, &c. in which they have ſheltered themſelves during the winter: they have alſo the month or moon of flowers; the month of corn; the cold month; the ſnow month, &c. When the moon does not appear above the horizon, they ſay the moon is dead, and ſome call the three laſt days of each moon "naked days." They have no diviſions of weeks, but days they count by ſleeps; half days by pointing to the ſun at noon, and quarters by the riſing and ſetting of the ſun; to expreſs which, in their traditions they make uſe of hieroglyphics. Their ſole knowledge in aſtronomy conſiſts in being able to point out the polar ſtar, by which they regulate their courſe when they travel by night. They reckon diſtances from one place to another by days' journies, each being about 20 miles. They have no knowledge of arithmetic, and though they are able to count to any number, figures and letters appear to carry with them ſome hidden myſtery, and much above their comprehenſion. Every ſeparate body of Indians is divided into bands or tribes, and forms a little community within the nation to which it belongs. As the nation has ſome particular ſymbol by which it is diſtinguiſhed from others, ſo each tribe has a badge from which it is denominated, as that of the eagle, the panther, the tiger, the buffalo, &c. Throughout every nation they particularize themſelves in the ſame manner, and the meaneſt perſon among them will remember his lineal deſcent, and diſtinguiſh himſelf by his reſpective family. Every band has a chief, who is termed the Great Warrior, and who is elected for his warlike qualifications; beſides this there is another who enjoys a pre-eminence as his hereditary right, and has the more immediate management of their civil affairs. When the chiefs are convened on any public buſineſs, they always conclude with a feaſt, at which feſtivity and cheerfulneſs know no limits. Dancing is a favourite exerciſe among the Indians, they never meet on any occaſion but this makes a part of the entertainment; and when they are not engaged in war or hunting, the youth of both ſexes amuſe themſelves in this manner every evening. The Indians have ſeveral kinds of dances which they uſe on different occaſions, as the pipe or calumet dance, the war dance, the marriage dance, and the dance of the ſacrifice. The movements in every one of theſe are diſſimilar, though it is impoſſible to give ſuch a deſcription of them as will convey to an European a juſt idea of the diſtinctions. Hunting is their principal occupation; they are trained to it from their youth, and it is an exerciſe which is eſteemed no leſs honourable than neceſſary towards their ſubſiſtence. A dextrous hunter is held nearly in as high eſtimation as a diſtinguiſhed warrior. Scarcely any device which the ingenuity of man has diſcovered for enſnaring or deſtroying thoſe animals that ſupply them with food, or whoſe ſkins are valuable to Europeans, is unknown to them. Every hunter prepares himſelf by faſting during ſeveral days: the reaſon they give for this is, that faſting enables them to dream freely, and in their dreams they are informed where they ſhall find the greateſt plenty of game; it is thought alſo to avert the diſpleaſure of evil ſpirits, and induce them to be propitious. They ſeem to have ſome notion of a future ſtate of exiſtence, and ſuppoſe that their employments there will reſemble thoſe in which they are engaged here, without the labour and difficulty annexed to them in this period of exiſtence. Among thoſe who have prieſts, theſe prieſts are their phyſicians and their conjurors: they cure their wounds and diſeaſes, interpret their dreams, give them charms which ſhall render them ſuperior to external danger, and ſatisfy their curioſity with regard to future events. The Indian is ſubject to but very few diſeaſes; the moſt fatal and deſtructive is the ſmall-pox, which to them has been the moſt terrible of all peſtilences: this is not, however, continual in their country, as it is in other nations; frequently there are intervals of many years in which it is never heard of; but when it prevails, towns and villages are thinned of their inhabitants. An Indian is ſaid to meet death, when it approaches him in his hut, with the ſame reſolution with which he has often faced it in the field. If he is a chief, and has a family, he makes a kind of funeral oration, which he concludes by giving to his children neceſſary advice for the regulation of their conduct. He then takes leave of his friends, and iſſues out orders for the preparation of a feaſt, which is deſigned to regale thoſe of his tribe that come to pronounce his eulogium. After the laſt ſtruggle the body is dreſſed in the uſual habiliments; the face is painted, and it is placed in a ſitting poſture on a mat in the middle of the hut, with his weapons by his ſide. His relations being ſeated round, each harangues the deceaſed body, in turn, and, if he happen to have been a great warrior, recounts his heroic actions. After this, the body is carried to the burying place, where it is interred with other ceremonies. Such are the general characteriſtics of the Indians; the peculiarities of each tribe will be found in other parts of the dictionary. The amount of Indian population cannot be preciſely aſcertained. The newly diſcovered iſlands in the South ſea, and part of the N. W. coaſt, are probably the moſt populous; as they have ſuffered leſs by invaders. The beſt informed writers have conjectured the number of aboriginal Indians in America to be under 2½ millions. Since the diſcovery of America, the decreaſe, in conſequence of labour and oppreſſion, famine and peſtilence, has been aſtoniſhing. A liſt of Indian tribes, in Imlay's Hiſtory of Kentucky, makes the aggregate number leſs than 60,000 of thoſe who inhabit the country, from the gulf of Mexico on both ſides of the Miſſiſippi to the gulf of St. Lawrence, and as far weſt as the country has been generally explored, that is, to the head water of the Miſſiſippi, and from thence a good way up the Miſſouri, and between that river and Santa Fé. The population of the Indian nations in the ſouthern parts of the United States is given differently from Mr. Imlay's ſtatement by Mr. Purcell, who reſided among them in 1780, as follows:

	Gun men.	Total.
Muſcogees, commonly called Creeks	5860	17,280
Chactaws	4131	13,425
Chickaſaws	575	2290
Cherokees	2800	8550
Catabaws	150	400
	13,516	42,033

The above red nations have ſomewhat increaſed ſince the general peace eſtabliſhed among them in 1777. The whites incorporated among them are few in number, and lead a vagabond life, connecting themſelves with one tribe after another. The increaſe of population is conſiderably checked by the uſe of ſpirituous liquors, and by a certain complaint introduced among them by the whites. In the northern diſtrict of North America, Mr. Hutchins, in 1778, eſtimated the Indians N. of the Ohio, and E. of the Miſſiſippi, at 13,800, and thoſe weſtward of lake Superior and the Miſſiſippi, at 10,000.

INDICATION, in *Phyſic*, ſignifies the pointing out or diſcovering what is fit to be done, and what means applied in any caſe, from a knowledge of the nature of the diſeaſe, and the virtue of medicines.

Indications are of four kinds: *preſervative*, or *prophylactic*, which direct how to cut off the cauſe of an approaching diſeaſe; *curative*, which ſhew how to remove a diſeaſe actually formed; *palliative*, which direct how to leſſen its effects, or take off ſome of its ſymptoms, before it can be wholly removed; and *vital*, which relate to the ſtrength of the body.

That part of phyſic which treats of indications is called *ſemeiotice*.

INDICATIVE, in *Grammar*, the firſt mood or manner of conjugating verbs, ſhewing either the time preſent, paſt, or future, and aſſerting what we think certain; and, therefore, ſometimes called the *declarative* mood.

I love is the preſent tenſe; *I loved*, the paſt; and *I will love* is the future of the indicative mood.

INDICATIVE *Column*. See COLUMN.

INDICATOR, in *Anatomy*, extenſor or abductor indicis, cubito-ſus-ouguien; a muſcle of the fore-finger, ſituated on the dorſal ſurface of the fore-arm. It is a ſlender muſcle, of an elongated figure, extended from the back of the ulna to the fore-finger. It ariſes, by ſhort aponeurotic fibres, from the poſterior ſurface of the ulna, beginning about the middle of the bone, and having its attachment extended towards the wriſt; and in a ſlight degree from the interoſſeous ligament. It is ſlender and pointed at its origin, grows gradually larger, and then diminiſhes again and forms a ſmall flattened tendon. From its origin at the middle of the ulna, it paſſes obliquely to the carpal end of the radius, and is confined at the ſurface of that bone in a fibrous ſheath common to it with the extenſor communis, to which it is here attached by means of the ſynovial membrane which lines the ſheath. Quitting the ſheath, it runs along the back of the hand, on the radial ſide of the tendon, which the fore-finger receives from the extenſor communis: theſe two approach each other, and are united at the articulation of the finger to the metacarpus. The common tendon paſſes over the back of the firſt joint of the fore-finger, over the firſt phalanx, and then divides into three portions, which terminate like thoſe of the extenſor digitorum communis: it correſponds to them alſo in every other particular. See EXTENSOR.

The poſterior ſurface of this muſcle is covered by the extenſor carpi ulnaris, the extenſor proprius auricularis, and extenſor communis digitorum, and by the integuments. Its anterior ſurface is in contact with the ulna, interoſſeous ligament, radius, carpus, interoſſeous muſcle of the ſecond interval, metacarpus, ſynovial membranes of the digital articulations, and the phalanges. The radial edge is in contact for a conſiderable ſpace with the extenſor tertii internodii pollicis; the ulnar edge is attached to a ridge of the ulna. It will extend the three phalanges of the fore-finger, and move it towards the ulnar edge of the hand, as in pointing to an object. It will extend the wriſt, and aſſiſt in the ſupination of the radius.

INDICAVIT, in *Law*, a writ or prohibition that lies for a patron of a church, whoſe clerk is ſued in the ſpiritual court by another clerk for tithes, which do amount to a fourth part of the profits of the advowſon; then the ſuit belongs to the king's court, by the ſtat. Weſt. 2. cap. 5. And the patron of the defendant being likely to be prejudiced in his church and advowſon, if the plaintiff recovers in the ſpiritual court, hath this means to remove it to the king's court. Reg. Orig. 35. Old Nat. Br. 31.

INDICIS EXTENSOR, in *Anatomy*. See INDICATOR.

———— *Semi-interoſſeus*. See ABDUCTOR.

INDICTION, ſignifies the convoking of an eccleſiaſtical aſſembly; as a ſynod, or council, or even a diet.

INDICTION is applied to the ſeveral ſeſſions of the ſame councils.

Hence it is, that at the end of the ſeſſions of the council of Trent, the decree by which the council appoints the day of the future ſeſſion, is called the indiction of that ſeſſion.

INDICTION, in *Chronology*, a term uſed for a kind of epocha, or manner of counting time among the Romans; containing a cycle or revolution of fifteen years, which, when expired, begins anew, and goes round again without intermiſſion.

This method of computation has no dependence on the heavenly motions. Petavius ſays, there is nothing in chronology leſs known than the Roman indiction; he means, than its original and commencement. It is the general opinion, that it was inſtituted in the time of Conſtantine, about the year 312; but this is a mere gueſs. There were indictions in the time of the emperor Conſtantius, as appears from the Theodoſian Code. The learned hold, that indictions were originally no other than certain annual taxes, the tariffs whereof were publiſhed every year; but why they were ſo called, why confined to a cycle of fifteen years, when, and on what occaſion, inſtituted, is not known.

We find three kinds of indictions mentioned in authors; the indiction of Conſtantinople, beginning on the firſt of September; the Imperial, or Cæſarean indiction, on the fourteenth of September; and the Roman or Papal indiction, which is that uſed in the pope's bulls, and which begins on the firſt of January.

The popes have dated their acts by the year of the indiction, which was fixed to the firſt of January, A. D. 313, ever ſince Charlemagne made them ſovereign; before which time they dated them by the years of the emperors.

At the time of the reformation of the calendar, the year 1582 was reckoned the tenth year of the indiction; ſo that beginning to reckon hence, and dividing the number of years elapſed between that time and this by 15, the remainder, with the addition of 10, will be the year of indiction, correſponding to the year of our Lord 1811. The indiction may alſo be found by adding 3 to the year of our Lord, and dividing the ſum by 15, the remainder is then the year of the indiction: if there be no remainder the indiction is 15. In either of theſe ways the year of indiction for 1811 is 14.

The word indiction comes from *indictio*, which ſignifies *eſtabliſhment*, *order*, or *denunciation*. The time of the indiction, among the Romans, was that wherein the people were ſummoned to pay a certain tribute; and it is for this reaſon, that the imperial indiction began towards the end of September; becauſe the harveſt being then got in, it was ſuppoſed the people could more eaſily pay their tax.

INDICTIVE, INDICTIVUS, an epithet given to certain feaſt-days appointed by the Roman magiſtrates, *viz.* the conſul, or prætor.

INDICTMENT, derived from the French *enditer*, *indicare*, or, according to M. Lambard, from ενδεικνυμι, *I charge*, *I inform againſt*, in *Law*, a bill or declaration, of complaint, drawn up in form of law, for the benefit of the commonwealth: exhibited as an accuſation of one for ſome offence, criminal or penal, and preferred to a grand jury, and by their verdict found to be true, and preſented before a judge or officer, who has power to puniſh or certify the ſame offence.

INDICTMENT, in *Common Law*, ſignifies as much as *accuſatio* among the civilians; though in ſome points it differs. See ACCUSATION.

Lambard ſays, an indictment is an accuſation at the ſuit of the king, by the oaths of twelve men of the ſame county where the offence was committed; returned to inquire of all offences in general in the county, determinable by the court into which they are returned, and their finding a bill brought before them to be true. But when ſuch accuſation is found by a grand jury, without any bill brought before them, and afterward reduced to a formed indictment, it is called a preſentment; and when it is found by jurors returned to enquire of that particular offence only, which is indicted, it is properly called an inquiſition.

Although a bill of indictment may be preferred to a grand jury upon oath, they are not bound to find the bill, if they find cauſe to the contrary; and though a bill of indictment be brought to them without oath made, they may find the bill if they ſee cauſe. But it is not uſual to prefer a bill unto them before oath be firſt made in court, that the evidence they are to give unto the grand inqueſt to prove the bill is true.

The grand jury (ſee Jury) are to find the whole of a bill, or to reject it; and not to find it ſpecially in part, &c. If they are ſatisfied of the truth of the accuſation, they then indorſe upon the bill of indictment "a true bill," anciently *billa vera*. But to find a bill, there muſt at leaſt twelve of the jury agree. The indictment, when ſo found, is publicly delivered into court.

As indictments are purely for the good and quiet of the commonwealth, they are to be preferred for criminal, not civil matters. They are uſed in caſes of high treaſon, and petit treaſon, felony, and treſpaſſes of all kinds, and in all pleas of the crown; though they cannot be uſed for injuries of a private nature, that neither concern the king nor the public; and therefore all indictments ought to be brought for offences committed againſt the common law, or againſt ſtatutes; and not for every ſlight miſdemeanor. A perſon cannot be indicted of ſuſpicion of felony, but of the very crime itſelf; and then if he be not in cuſtody, the ſheriff is commanded to attach his body by a capias, &c. A perſon indicted for felony may have counſel allowed to ſpeak for him, as to matter of law only: but ſuch as are indicted for treaſon may have a copy of their indictment before trial, in order to adviſe with counſel; and ſuch indictments are to be found within three years after the offence committed, unleſs the treaſon be directly againſt the king's perſon. (7 and 8 W. III. cap. 3. which is extended to trials on impeachments by 28 Geo. II. cap. 30.) Perſons indicted of treaſon muſt be by the oaths of two witneſſes; but in other caſes one witneſs is ſufficient. The priſoner, in this caſe, ſhall alſo have a copy of the indictment, but not the names of the witneſſes, five days at leaſt before the trial, *i. e.* upon the true conſtruction of the act 7 W. III. cap. 3. before his arraignment; he ſhall alſo have a copy of the panel of jurors two days before his trial; and he ſhall have the ſame compulſive proceſs to bring in his witneſſes for him, as was uſual to compel their appearance againſt him. By 7 Ann. cap. 21. every perſon indicted for high treaſon, or miſpriſion of treaſon, ſhall not only have a copy of the indictment, but a liſt of all the witneſſes to be produced, and of the jurors impanelled, with their profeſſions and places of abode, delivered to him ten days before the trial, and in the preſence of two witneſſes. But this laſt act, ſo far as it affected indictments for the inferior ſpecies of high treaſon, reſpecting the coin and royal ſeals, is repealed by the ſtatute 6 Geo. III. cap. 53. But no perſon indicted for felony is, or (as the law ſtands) can be, entitled to ſuch copies, before the time of his trial.

Indictments muſt be certain in every point, and charge ſome particular offence; alſo goods ſtolen muſt be particularly ſet down, and the offence laid poſitively, and not by way of recital. There muſt alſo be expreſſed the Chriſtian name, ſurname, and addition of the offender, with the day, year, and place in which the offence was committed, as alſo the nature of the offence. (1 Hen. V. cap. 5.) In an indictment for murder, the length, depth, or other dimenſions of the wound, muſt be expreſſed, that a judgment may be formed whether it was mortal; and in this caſe, the time of the death muſt be laid within a year and a day after the mortal ſtroke was given. (See Appeal.) And in felony, the value of the things ſtolen is to be particularly mentioned, in order that it may appear whether the offender has been guilty of grand or petit larciny. A miſtake in ſpelling the defendant's ſurname is not a ſufficient cauſe for abating the indictment, provided it ſounds like it. If a word of conſequence be omitted in an indictment, it renders the whole naught; but the caſe is not the ſame where a word of form is omitted, or where there is an omiſſion of a ſynonymous word, if the ſenſe is not injured. In ſome crimes particular words of art muſt be uſed, which are ſo appropriated by the law to expreſs the preciſe idea which it entertains of the offence, that no other words, however ſynonymous they may ſeem, are capable of doing it. Thus, in treaſon, the facts muſt be laid to be done "treaſonably, and againſt his allegiance;" anciently, *proditorie et contra ligeantiæ ſuæ debitum*;" elſe the indictment is void. In indictments for murder, it is neceſſary to ſay that the party indicted "murdered," not "killed" or "ſlew" the other; which, till the late ſtatute, was expreſſed in Latin by the word "*murdravit*." In all indictments for felonies, the adverb "feloniouſly, *felonicè*," muſt be uſed; and for burglaries alſo "*burglariter*," or in Engliſh, "burglariouſly;" and all theſe to aſcertain the intent. In rapes the word "*rapuit*," or "raviſhed," is neceſſary, and muſt not be expreſſed by any periphraſis; in order to render the crime certain. So alſo in larcinies, the words "*felonicè cepit et aſportavit*," "feloniouſly took and carried away," are neceſſary to every indictment; for theſe only can expreſs the very offence. In caſe one part of an indictment is inconſiſtent with another part of it, the indictment becomes void; though where the ſenſe is plain, the court will diſpenſe with a ſmall inconſiſtency. Indictments are amendable the ſame term they are brought into court, but not afterwards; and in criminal proſecutions, the amendment muſt be only ſuch as is permitted by the common law. Indictments for crimes committed, ought to be laid in the county where they were done; for otherwiſe, upon pleading the general iſſue not guilty, if it appears that the offence was committed in another county or place different from that in the indictment, the defendant will be acquitted. Yet if larciny be committed in any one county, and the goods carried into another, the offender may be indicted in either for the offence is complete in both. (1 Hal. P.C. 507.) Or, he may be indicted in England for larciny in Scotland, and carrying the goods with him into England, or *vice verſa*; or for receiving in one part of the united kingdoms goods that have been ſtolen in another. (Stat. Geo. III. c. 31.) But for robbery, burglary, and the like, he can only be indicted where the fact was actually committed; for though the carrying away and keeping of the goods is a continuation of the original taking, and is therefore larciny in the ſecond county, yet it is not a robbery or burglary in that juriſdiction. And if a perſon be indicted in one *county* for larciny of goods originally taken in another, and be thereof convicted or ſtands mute, he ſhall not be admitted to his clergy; provided the original taking be attended with ſuch circumſtances, as would have ouſted him of his clergy by virtue of any ſtatute made previous to the year 1691. (Stat. 25 Hen. VIII. 3 W. and M. c. 9.

An offender is ſubject to indictment for a felony committed againſt a perſon unknown; yet ſomebody muſt be proved to be the proprietor upon the trial, or elſe the property will be preſumed to be in the priſoner, he having pleaded not guilty. An indictment being at the king's ſuit, the proſecutor is a good witneſs to prove the charge contained in it; and no damage can be given to the party aggrieved, except it be particularly grounded on ſome ſtatute. Indictments before juſtices of the peace may be removed by certiorari into the king's bench.

A bill of indictment is ſaid to be an accuſation, becauſe the jury, who inquire of the offence, do not receive it till the party that offered the bill, appearing, ſubſcribes his name, and offers his oath for the truth of it.

It is always at the ſuit of the king, and differs from an accuſation in this, that the preferrer is no way tied to the proof thereof upon any penalty if it be not proved, except there appears a conſpiracy. But if any one prefer an indictment to the grand jury for any criminal offence, without probable cauſe, and the bill is not found, or the party is acquitted, action lies for a malicious proſecution. In order to which it is neceſſary that the plaintiff ſhould obtain a copy of the record of his indictment and acquittal; but in proſecutions for felony, it is uſual to deny a copy of the indictment, where there is any the leaſt probable cauſe to found ſuch proſecution upon. But an action for a malicious proſecution may be founded on ſuch an indictment whereon no acquittal can be; as if it be rejected by the grand jury, or be *coram non judice*, or be inſufficiently drawn.

Indictments, *Demurrer to*. See Demurrer.

INDICTOR, in *Law*, he that indicteth another for an offence: and *indictee* is the party who is indicted. 1 Ed. III. cap. 11. 21 Jac. I. cap. 8.

INDICUM. In the writings of the ancients we find this word very frequently uſed, as the name of a blue colour, or pigment uſed in dyeing, and imported to Rome, Greece, and other parts of the world, from the Eaſt Indies. The greater number of writers make this the ſame with our indigo, or anil feculæ; and ſome ſay it was the ſame with our woad; but the former opinion ſeems moſt probable.

This ſubſtance, which the Greeks call indicum, the Arabian writers, Avicenna, Serapion, and others, have called *nil;* though the ſame word is alſo ſometimes uſed by them for the pigment made from woad. See Indigofera.

Indicum *Folium*. See Folium and Tamalapatra.

INDICUS Calmus, in *Natural Hiſtory*, is a foſſil coralline body, ſuppoſed formerly to repreſent ſome ſpecies of reed, beſet with ſtars on the ſurface.

Indicus *Cocculus*. See Cocculus.

Indicus *Color*, a term uſed by ſeveral of the ancient writers to expreſs black. The generality of the Greek and Roman phyſicians of old times have called the black lignum aloes, *agallochum indicum;* and the only black kind of myrobalan they were acquainted with, was in the ſame manner called the indicum; not that theſe were ſuppoſed peculiarly the product of the Indies, in diſtinction from the paler lignum aloes, or the other myrobalan; but that they were of that colour which they called indicus color.

Indicus *coſtus*. See Costus.

INDIES, East, in *Geography*, comprehends that vaſt tract of country, which is ſituated in the ſouth of Tartary, between Perſia and China, as well as the iſlands in the Eaſt Indian ſea, ſuch as Borneo, Sumatra, Ceylon, Java, the Maldives, Celebes, Moluccas, Philippines, &c. See India and Hindoostan, and each iſland ſeparately.

Indies, *Weſt*, includes iſlands of the Atlantic, which extend from the weſt of Florida, in a curve, to the coaſt of Surinam, in South America, from W. long. 58° 20′ to 85° 30′, and from N. lat. 10° to 27° 50′; Cuba being made the weſterly boundary, and the Bahamas the moſt northerly; and fixing the eaſterly point at the iſland of Barbadoes, and the ſoutherly at Trinidad. The name was given by Columbus, and has not been unfrequently applied to the whole of America. See each iſland ſeparately deſcribed.

INDIGENOUS, of *indigena*, denotes a native of a country; or that which was originally born or produced in the country where it is found. In this ſenſe, particular ſpecies of animals and plants are ſaid to be indigenous in the country where they are native, in oppoſition to exotic.

INDIGESTION, in *Medicine*, in the acceptation in which we employ the term, implies not only the imperfect performance of the act of digeſtion, but alſo an impaired condition of the functions of the ſtomach and chylopoetic viſcera in general.

In uſing the term *indigeſtion* in this extenſive ſenſe, we follow the example of Dr. Cullen, who has comprehended, under the head of *Dyſpepſia* (from δυς, *ill*, and πεπτειν, *to digeſt*), a great variety of ſymptoms, which other noſologiſts have conſidered as diſtinct diſeaſes, and deſcribed under various appellations, but which, he is of opinion, are all referrible to one common cauſe, an imbecility, or loſs of tone in the ſtomach. (See Cullen, Noſol. Method. Gen. xlv. and Firſt Lines, § 1190, and 1193). Among the ſymptoms juſt alluded to, which ſtand as diſtinct genera in other noſological ſyſtems, are *Anorexia*, or *loſs of appetite; Cardialgia*, or *heart-burn; Gaſtrodynia*, or *ſtomach colic; Flatulentia*, or *flatulence; Nauſea; Vomitus*, *Soda*, &c. (See the Noſol. Syſtems of Sauvages, Vogel, and Linnæus.) To the ſame diſordered condition of the digeſtive organs, when it is ſympathetic of, or combined with other complaints, Dr. Cullen likewiſe referred many of thoſe undefined affections, which have been confuſedly claſſed together under the general title of *nervous diſeaſes*, or under that of *chronic weakneſs*. From the great importance of the ſtomach in the animal economy, in which it is, as it were, the laboratory of health, and from its ſympathetic relation to every other important organ in the body, it is obvious that every derangement to which it is expoſed muſt occaſion ſome correſponding derangement in other parts of the ſyſtem, and that it muſt ſuffer, in its turn, whenever any diſtant organ is much indiſpoſed; and hence, that indigeſtion will moſt frequently be accompanied with various adventitious ſymptoms, and that it will be of two kinds, idiopathic and ſympathetic, according as the ſtomach itſelf, or ſome other organ, is the ſeat of the primary diſorder. It is of the idiopathic indigeſtion, however, that we particularly treat at preſent.

The ſymptoms which characterize idiopathic *dyſpepſia*, are an irregular, but commonly deficient appetite, with occaſional ſqueamiſhneſs, ſometimes actual vomiting;—a ſenſe of load and diſtention of the ſtomach after meals, followed by eructations of air, or of ſolid or fluid matter, of various qualities, acid, pungent, nidorous, or inſipid;—heartburn, and pains in the region of the ſtomach. Some or all of theſe ſymptoms occur at different times or in different individuals, and are commonly combined with irregularity of the bowels, which are moſt frequently coſtive, but ſometimes lax, or in each of theſe ſtates by turns. The mouth and throat are uſually dry, eſpecially in the morning, and the tongue is at the ſame time furred, and of a white or yellow colour, and there is a diſagreeable taſte on the palate.

Theſe are the direct indications of a deranged condition of the ſtomach itſelf, and the conſequent irritation of ill-digeſted aliment. The ſenſe of load is occaſioned by the remora of the food in its undigeſted ſtate, and that of diſtention by the evolution of air, which is probably occaſioned by the ſpontaneous decompoſition or fermentation of the alimentary matter, and is relieved by eructation and the diſcharge of flatus. The irritation of the acid or acrid crudities upon the coats of the ſtomach, eſpecially about the upper orifice, excites the ſenſation of heart-burn, and occaſional ſpaſmodic and inverted actions of the ſtomach and gullet, by which eructations are produced, as well as ſpaſmodic contraction of the muſcular parts of the ſtomach, which is accompanied by pain or gaſtrodynia: over-diſtention of the coats of the ſtomach, by the flatus, is likewiſe productive of pain.

But in addition to theſe morbid ſenſations and phenomena in the ſtomach itſelf, an infinite variety of ſymptoms occur, in different inſtances, indicating the ſympathetic affection of the conſtitution at large, or of particular organs. Theſe have commonly been called *nervous* ſymptoms, inaſmuch as they have originated merely from a ſympathy of parts, independently of any diſordered ſtate of the circulation, or of any morbid change in the ſtructure of the ſuffering organs; and they are often more diſtreſſing than the primary ſymptoms belonging to the affection of the ſtomach. Among the ſymptoms to which we allude, are languor, ſluggiſhneſs, and indiſpoſition to exertion, either mental or corporeal, but eſpecially the latter; drowſineſs, particularly after meals or ſlight exerciſe; giddineſs, noiſe in the ears, occaſional dimneſs of ſight, or a ſenſe of objects floating before the eyes, with head-ache under various forms, moſt frequently affecting the forehead and temples, ſometimes the crown and the *occiput;* ſevere flying pains; palpitations of the heart, or intermiſſions in its pulſation, with conſiderable variations in the ſtate of the pulſe; total reſtleſſneſs, or unrefreſhing ſleep during the night, with frightful dreams, the *incubus*, or night-mare, &c.; temporary abſence of mind, impaired memory, unuſual timidity and deſpondency; and, in ſhort, all the train of complaints which belong to *hypochondriaſis* and *hyſteria* in the conſtitutions in which they are liable reſpectively to occur. See theſe articles.

The experiments of modern phyſiologiſts have ſhewn that the proceſs of digeſtion is principally effected by means of the fluids of the ſtomach, which poſſeſs a ſolvent power over the ſubſtances uſed as aliment; and that it is not a proceſs of concoction, putrefaction, attrition, or fermentation, as was anciently ſuppoſed. (See DIGESTION.) It would ſeem, therefore, that the eſſential cauſe of idiopathic dyſpepſia conſiſts in a change in the quantity or quality of this gaſtric fluid, or ſolvent, originating from an impaired condition of the ſecretory function of the ſtomach. This, however, can perhaps only be aſcribed to the deficiency of its tone and vigour as a muſcular organ. Dr. Cullen juſtly remarks, that, as the peculiar nature of the digeſtive fluid, the changes which it may undergo, and the cauſes by which it may be changed, are very little known to us, we cannot found a practical doctrine upon any ſuppoſition reſpecting it; but as, at the ſame time, the imbecility of the ſtomach, either as the cauſe or the effect of the change in the digeſtive fluid, ſeems always to be preſent, and to have a great ſhare in occaſioning the ſymptoms of indigeſtion, we may ſtill conſider the imbecility of the ſtomach as the proximate and almoſt ſole cauſe of *dyſpepſia*. He obſerves, too, that this view of the ſubject is the more admiſſible, as it appears to be fully and clearly applicable to the explanation of the practice which experience has eſtabliſhed as the moſt ſucceſsful in this diſeaſe. Firſt Lines, § 1196.

Cauſes of Indigeſtion.—Certain original conſtitution of the body is obviouſly connected with a prediſpoſition to this complaint: this is ſometimes manifeſt only in a defective performance of the functions of the ſtomach itſelf; but in other caſes it is evidently a part of the general want of tone and vigour in the body, and occurs in perſons of lax fibre, and ſanguine or ſanguineo-phlegmatic temperament. In perſons of dark and ſallow complexion, the ſtomach itſelf appears to be often originally weak, in a degree diſproportionate to the general condition of the habit.

The *exciting cauſes* of indigeſtion, then, muſt be looked for among thoſe circumſtances which tend either to produce a loſs of tone in the muſcular fibres of the ſtomach, or which, in the debilitated ſtate of that organ, tend to oppreſs its powers and to impede its functions. The cauſes which contribute to impair the vigour of the ſtomach are of two kinds; namely, thoſe which operate directly upon that organ, and thoſe which affect it indirectly, or through the medium of the general ſyſtem.

The vigour of the ſtomach is impaired by the exceſſive uſe of ſtimulating condiments, and of ſpirituous liquors, as well as by the abuſe of certain articles of the ſedative or narcotic kind, ſuch as tobacco, tea, coffee, opium, bitters; and by the too frequent and copious uſe of acid and aceſcent articles of food, and of warm watery liquids. Frequent vomiting, whether ariſing ſpontaneouſly or excited by art, tends alſo greatly to debilitate the ſtomach; and over-diſtention of the organ by an exceſſive quantity of food or drink, or the uſe of food in itſelf difficult of digeſtion, or difficult from the idioſyncraſy of the individual, equally contribute to the ſame effect. The want of due maſtication, and of the proper commixture of the ſaliva with the food, by which its tendency to putrefactive decompoſition may be diminiſhed, likewiſe materially enfeebles the digeſtive powers of the ſtomach, and adds to the oppreſſion where it is already weakened. Whence the habit of frequent ſpitting, or rejection of the ſaliva, is juſtly enumerated among the cauſes of indigeſtion. Compreſſion of the ſtomach after a full meal, as by particular poſtures, &c., or violent exerciſe or ſucceſſion of the body, under the ſame circumſtances, have been found to have a material influence in preventing the proceſs of digeſtion, and oppreſſing the powers of the ſtomach. Hence various occupations and trades, in which compreſſion and ſucceſſion of the diſtended ſtomach are daily produced, occaſion habitual *dyſpepſia* in thoſe who are prediſpoſed to the diſeaſe.

Many of theſe occupations, however, debilitate the ſtomach likewiſe through the medium of the general ſyſtem, or by deranging other organs and functions with which the ſtomach particularly ſympathiſes. The ſedentary and inactive life, connected with many of them, debilitates the body in all its functions, and the ſtomach moſt particularly; intenſe ſtudy, or cloſe application of mind to any buſineſs, when long continued; grief, anxiety, vexation of mind, and diſorderly paſſions of any kind; venus immodica; expoſure to moiſt and cold air, when without exerciſe; and frequent intoxication, which belongs partly to this head, and partly to the former,—are all common remote cauſes of that imbecility of ſtomach which is connected with indigeſtion. Dr. Cullen remarks, that, though the diſeaſe, as proceeding from the laſt ſet of cauſes, may be conſidered as a ſymptomatic affection only; yet as the diſorder of the ſtomach is generally the firſt, always the chief, and often the only effect which theſe cauſes produce or diſcover; ſo the affection of the ſtomach may be conſidered as the diſeaſe chiefly to be attended to in practice; and the more properly ſo, as in many caſes the general debility is only to be cured by reſtoring the tone of the ſtomach, and by remedies firſt applied to this organ.

On the other hand, however, it is not to be omitted, that the ſtomach, from its extenſive ſympathy, by which it is often a partaker of morbid irritation ſeated in other organs, occaſionally diſplays ſymptoms of derangement ſo violent, and apparently ſo confined to itſelf, as to make the primary and proper ſource of the derangement be altogether overlooked. Many inſtances might be quoted of the ſucceſsful treatment of ſeemingly idiopathic dyſpepſia, by remedies which manifeſtly and chiefly operate upon other organs, and exert little or no immediate beneficial influence on the ſtomach. The viſcera, more immediately concerned in the function of digeſtion, eſpecially the liver, and the alimentary canal, are often the ſeat of the original irritation in ſuch caſes; the kidneys and the uterus occaſionally produce ſimilar effects.

Treatment of Indigeſtion.—In attempting to cure this ſtate of the ſtomach, we may conſider the following indications as the principal points to be purſued: *firſt*, to avoid, or remove, or, as far as may be, to regulate thoſe things which have been enumerated above as the ordinary exciting cauſes of the diſeaſe; *ſecondly*, to palliate or remove thoſe urgent ſymptoms, which eſpecially contribute to aggravate and continue the diſeaſe; and *thirdly*, to reſtore the tone and vigour of the ſtomach, and of the ſyſtem at large.

The propriety and neceſſity of the firſt indication is ſufficiently evident, as the continued application, or frequent repetition of thoſe cauſes, muſt neceſſarily tend to continue the diſeaſe, to defeat the efficacy of remedies, or to occaſion the recurrence of the diſorder in ſpite of the operation of theſe. Dr. Cullen juſtly remarks, that it is commonly owing to the neglect of this indication, that this diſeaſe is ſo frequently obſtinate in its duration. It would be ſuperfluous to enumerate the various modes of fulfilling this indication, which will be ſufficiently obvious from the conſideration of the ſeveral cauſes: but this circumſtance evinces the importance of minutely inveſtigating the origin of the diſorder, previous to the adminiſtration of remedies, and of aſcertaining whether the dyſpepſia be conſtitutional or acquired, whether idiopathic or ſymptomatic, whether owing to any organic derangement of the ſtomach, ſuch as tumour, ulcer, or ſcirrhoſity, or whether ariſing merely from errors in diet, or other extrinſic agents. It muſt be obſerved, however, that the accompliſhment of this firſt indication is often exceedingly difficult: for, in many caſes, the circumſtances of the patient will not admit of any material change; his avocations themſelves, upon which his ſubſiſtence depends, comprehend, perhaps, the principal cauſe of the miſchief. More frequently, the obſtacles ariſe from the difficulty of inducing men to break in upon eſtabliſhed habits, or to renounce the purſuit of pleaſure; and eſpecially, to perſuade them that thoſe practices, which they have often repeated, and ſeen others repeat, with ſeeming impunity, are in reality prejudicial.

Some allowance, indeed, is neceſſary to be made for the influence of habit, in all changes that relate to the animal economy, and eſpecially where theſe habits have been carried to the extreme. For if the ſtomach have been long accuſtomed to exceſſive ſtimuli, whether from condiments or ſpirituous liquors, the total abſtraction of theſe from the diet might occaſion a direct debility, under which the powers of life might ſink. Under ſuch circumſtances, therefore, ſome degree of the accuſtomed ſtimulus muſt be for ſome time indulged in, or ſome leſs prejudicial one ſubſtituted. But the apprehenſions of danger, from great changes in the habits of life, which are generally entertained, are carried to an extent which experience does not juſtify. Almoſt all the general rules which can be laid down, in reſpect to the wholeſomeneſs of certain articles of diet, admit of exceptions from peculiarities of conſtitution in particular individuals. Some indications on this point, however, may be obtained by attending to the obvious prevailing ſtate of the ſtomach, as evinced by the acid or nidorous eructations, &c. The acid ſtate of the ſtomach implies the neceſſity of diminiſhing the proportion of vegetable food; while the nidorous condition may be benefited by augmenting that part of the diet, and leſſening the quantity of animal food. It is of much importance that the whole quantity of food ſhould be ſuch as not to overload the ſtomach, or occaſion conſiderable diſtention. There is a common precept, under which great errors are ſometimes committed, in the way of overloading the ſtomach, or at leaſt of exhauſting its digeſtive powers, namely, that of eating little and often, ſo that long faſting may be avoided on the one hand, and too much repletion on the other. With the view of fulfilling this precept, an almoſt inceſſant ſupply of aliment is ſometimes thrown into the ſtomach; ſo that the digeſtion of one portion is never completed, before another is combined with it in a crude ſtate, thus aggravating the crudities which the diſeaſe itſelf produces, or preventing their more effectual aſſimilation.

In fulfilling the *ſecond* indication, of removing urgent ſymptoms, one of the firſt objects purſued by ſome practitioners, is that of removing the crudities of the ſtomach produced by the diſeaſe, by means of emetics: Dr. Cullen himſelf appears to be the advocate of this practice. (Firſt Lines, par. 1204.) Nevertheleſs, as theſe crudities are commonly the effect of the diſeaſe, and not the cauſe, the expulſion of them from the ſtomach by vomiting can afford but a brief and temporary relief; and the ſame uneaſineſs will recur after the firſt or ſecond meal. And, moreover, experience has ſhewn us, that frequent vomiting, however excited, tends to weaken the ſtomach, to diminiſh its powers of digeſtion, and to render it leſs able to retain what is thrown into it, and therefore ultimately to aggravate the ſymptoms which it was intended to relieve. "They are unhappy," ſays the ſame phyſician in another place, "who truſt to this mode of relief, and have frequent recourſe to it; for I am certain, from much experience, that frequent vomiting hurts the tone of the ſtomach, and often makes the ſymptoms of digeſtion recur more frequently and ſooner than they otherwiſe would have done." (Cullen on Mater. Medica, vol. ii. p. 465. See alſo EMETICS.) We have ſtated under that article, the circumſtances which have led to the erroneous ſuppoſition, that the indigeſtion and its concomitant ſymptoms originate in the preſence of bile and other extraneous fluids in the ſtomach; and explained how the diſcharge of bilious and mucous matters from the ſtomach, under the operation of an emetic, may be the effect of the vomiting, although they might not previouſly have been lodged there. In ſhort, there are few inſtances of *dyſpepſia* in which the uſe of emetics can be deemed beneficial.

Of the other urgent ſymptoms, which require to be palliated, the principal are *acidity*, and its frequent concomitant, *heart-burn*,—pain in the ſtomach,—the ejection of a copious and clear fluid, or *water-braſh* (as it is termed in Scotland),—and *conſtipation* of the bowels. It will not be neceſſary for us to dilate upon the method of treating theſe ſymptoms here, ſince they will be found amply diſcuſſed under their proper heads; as they are often ſo peculiarly diſtreſſing to the patients, as to be conſidered themſelves the principal diſeaſes, and to be the principal ſubject of complaint. We may briefly obſerve, that the preſence of acid in the ſtomach in a morbid degree is known, not only by its riſing occaſionally into the mouth and throat by eructation, and by the heart-burn which accompanies it (ſee Cardialgia); but alſo by the occurrence of gnawing pains in the ſtomach, flatulency, irregular cravings for food, griping and looſeneſs of the bowels, &c. The acidity already preſent in the ſtomach may be corrected, by neutralizing it by means of a chemical combination with ſome alkali or abſorbent earth. The three alkalis, ſoda, potaſs, and ammonia, may be taken for this purpoſe reſpectively, either in the pure (or cauſtic) ſtate, or mild, *i. e.* in the form of carbonates: on the whole, they ſeem to be more efficacious in the pure ſtate. The ſoda-water, now manufactured in the ſhops, is an agreeable form of antacid; but the alkali may be taken with advantage in larger quantities than that beverage contains. Magneſia, chalk, and the teſtaceous powders prepared from crabs-claws and oyſter-ſhells, which are carbonates of lime, likewiſe combine with the gaſtric acid, and neutralize it: the magneſia (which is much more effectual in its pure ſtate, or calcined, than in the form of carbonate) is often uſeful, inaſmuch as it forms a neutral ſalt, which is in ſome degree laxative, with the acid of the ſtomach. It is not, however, ſufficient to neutralize the preſent acidity, the diſpoſition to generate it muſt be alſo obviated. This is to be effected partly by avoiding aceſcent aliments of the vegetable claſs, and uſing animal food, ſuch as is little capable of aceſcency. But as vegetable food cannot be entirely diſcarded, the exceſs of its aceſcency may be in ſome meaſure avoided, by chuſing ſuch vegetable matters as are the leaſt diſpoſed to the vinous fermentation, ſuch as leavened bread, and well fermented liquors; and inſtead of uſing the freſh native acids, employing vinegar. But the diſpoſition to acidity may be farther prevented by other means; namely, by thoſe which invigorate the muſcular fibres of the ſtomach, to be mentioned preſently. It appears that the acidity occurs in a morbid quantity, either from a change in the digeſtive fluids, becoming leſs fit to moderate the natural progreſs to fermentation, or from their not being ſupplied in ſufficient quantity; both of which probably ariſe from a weakened action of the ſtomach. For it is obſerved, in ſome inſtances, that ſedative or depreſſing paſſions immediately occaſion the appearance of acidity in the ſtomach, which did not appear before; and alſo that the uſe of ſtimulants, applied to the ſtomach, often corrects or obviates an acidity, that would otherwiſe have appeared.

Of that ſymptom of the dyſpeptic ſtate of the ſtomach, which is a common concomitant of indigeſtion, *pain*, or *ſtomach-colic*, *gaſtrodynia*, we have already treated at length. (See the laſt term.) Having there ſtated the various circumſtances under which it occurs, and eſpecially in the two oppoſite ſtates of repletion and inanition, as well as the method of cure, which ſucceed in theſe two conditions reſpectively, we deem it unneceſſary to repeat the obſervations here.

In fulfilling the ſecond indication, another ſymptom which requires particularly to be obviated is *coſtiveneſs*. There is ſo much connection between the ſeveral portions of the alimentary canal with reſpect to the periſtaltic motion, that if accelerated or retarded in any one part, the other parts of it are commonly affected in the ſame manner. Thus as the briſker action of the ſtomach muſt accelerate the action of the inteſtines, ſo the ſlower action of the inteſtines muſt in ſome meaſure retard that of the ſtomach. It is therefore of conſequence to the proper action of the ſtomach, that the periſtaltic motion of the inteſtines, determining their contents downwards, be regularly continued, and that all coſtiveneſs, or interruption of that determination, be avoided. But an indiſcriminate uſe of cathartic medicines is much to be deprecated. For it muſt be obſerved, that, as every conſiderable evacuation of the inteſtines weakens their action, and tends therefore to induce coſtiveneſs when the evacuation is over; ſo thoſe purgatives which produce a large evacuation are unfit for correcting the habit of coſtiveneſs. The milder cathartics, therefore, are the moſt ſuitable for this purpoſe, which do no more than ſolicit the inteſtines to a more ready diſcharge of their preſent contents, without either hurrying their action, or increaſing the excretions into their cavity; either of which might produce a purging. Dr. Cullen was of opinion, that medicines which particularly ſtimulate the large inteſtines, and act little on the higher parts of the inteſtinal canal, were peculiarly proper for this purpoſe, ſuch as the aloetic, and other reſinous purgatives. Theſe medicines certainly produce a very beneficial operation in numerous inſtances, probably by ſupplying the place, as it were, of the bile, which appears to be the natural tonic and laxative to the inteſtines, and which is often both deficient in quantity, and depraved in quality, in dyſpeptic habits. The augmentation and correction of this fluid is often an important object in the treatment of indigeſtion, and the changes in the appearance, odour, and conſiſtence of the ſtools, as well as the preſence or abſence of griping, teneſmus, heat and irritation in the ſeat, &c., are among the principal diagnoſtic ſymptoms in regard to the condition of the bile, which ſeems to be the chief cauſe of the variations of the alvine diſcharge. (See Abernethy's Obſervations on the Diſ. of the Health, &c.) For the purpoſes of augmenting and correcting the biliary ſecretion, the milder preparations of mercury, which require to be varied according to circumſtances, which have not yet been accurately deſcribed, appear to be the moſt effectual agents. It is probable that the long expected treatiſe of Dr. James Curry will contribute materially to elucidate this important ſubject; and we truſt that we ſhall be able to avail ourſelves of the aſſiſtance of that work, before we compoſe our article on the *chronic diſeaſes of the* Liver.

The peculiar modification of dyſpepſia, called by the Scotch *water-braſh*, the *Cardialgia ſputatoria* of Linnæus, (Gen. Morborum, Claſs iv. Ord. 1.) and the *Pyroſis* of Cullen, (for which we have no appropriate Engliſh name,) is a ſufficiently diſtinct diſeaſe to be diſcuſſed in a ſeparate article. See Pyrosis. See alſo Flatulence, Nausea, and Vomiting.

The *third* indication, which is properly the curative one, is to reſtore the tone and vigour of the ſtomach, the loſs of which is deemed the principal ſource of the diſeaſe. The means of accompliſhing this indication may be referred to two heads; one of which includes thoſe means which operate directly and chiefly on the ſtomach itſelf; and the other, thoſe which, operating upon the whole ſyſtem, communicate their tonic powers ſecondarily to the ſtomach.

The medicines which operate directly on the ſtomach, compriſe all thoſe articles which are denominated *tonics*, and many of thoſe called *ſtimulants*, and *aſtringents*.—The bitter vegetable ſubſtances, or *bitters*, as they are emphatically called, and eſpecially thoſe which combine ſome aromatic quality with their bitterneſs, are moſt frequently preſcribed for this purpoſe, and poſſeſs very conſiderable efficacy. Such are the roots of gentian, colomba, and rhubarb; the bark of cinchona, caſcarilla, &c.; the quaſſia wood; the flowers of chamomile; and many other vegetable productions. Experience, however, ſeems to have decided, that theſe bitters cannot be taken for a great length of time with impunity. Some have imagined that there is a certain quantity of a narcotic power reſident in them, which, though inſenſible in its effects for a conſiderable time, ultimately occaſions a deleterious influence on the conſtitution. This was particularly learned from the conſequences of a long-continued uſe of the celebrated Portland Powder, for the cure of the gout: a very large number of thoſe perſons who took that medicine, which conſiſted of bitters and aromatics, having died of apoplexy, or ſome other ſevere diſeaſe, after having been apparently much benefited by its uſe. When theſe medicines are taken, therefore, with a view to reſtore the tone and vigour of the ſtomach, it is adviſable not to employ them unremittingly for a great length of time; but to ſuſpend the uſe of them occaſionally for a conſiderable period, ſubſtituting ſome other corroborant medicines, if neceſſity require them. Among theſe the *mineral acids* are important adjuvants, eſpecially the ſulphuric (or vitriolic) and muriatic acids; which have not only a direct tonic power upon the ſtomach, increaſe the appetite, and aid digeſtion, but alſo tend to prevent the proceſs of fermentation in the food taken in. In this way, probably, their efficacy in preventing the formation of acidity in the ſtomach, and the heart-burn, &c. ariſing from ſuch acidity, is to be explained. It is certain, that, in many inſtances, where the alkalies and abſorbents have failed to obviate acidity and its conſequences, connected with indigeſtion, the free uſe of one or other of the mineral acids has effectually remedied the diſorder. *Aromatic* ſubſtances ſtimulate the ſtomach, and frequently therefore relieve aceſcency, flatulence, and cardialgia; *e. g.* cinnamon, ginger, capſicum, &c. but their ſtimulus is tranſitory, and if they are frequently repeated, and taken in large quantities, they may injure the tone of the ſtomach. *Chalybeate* medicines, or the various preparations of iron, are often employed as tonics, in the cure of indigeſtion; and they may be adminiſtered in conſiderable quantities with ſafety. They have not, however, been found ſo efficacious in the cure of indigeſtion, as the remedies above-mentioned; and they are principally taken in the form of *chalybeate waters*. But it is certain that theſe waters contain in general a very ſmall proportion of ſteel; and that other preparations of the ſteel are adminiſtered in much larger quantities without producing thoſe ſalutary effects, which are often aſcribed to the mineral waters; it is, therefore, probable that the benefits, which are obſerved to accrue during the uſe of theſe waters, are generally the reſult of other circumſtances connected with the drinking of them.

For, in fact, the moſt eſſential means of fulfilling the third indication are thoſe which ſtrengthen the ſyſtem at large, and thus indirectly reſtore the vigour of the ſtomach; and among theſe, *exerciſe* claims our firſt notice. We have ſhewn, in its proper place, the mode in which exerciſe operates, in promoting the full and perfect circulation of the fluids through all the organs of the body, and therefore in perfecting the performance of all the functions. (See EXERCISE.) But we may remark, with Dr. Cullen, that it in a particular manner ſtrengthens the ſtomach by promoting perſpiration, and exciting the action of the veſſels on the ſurface of the body, the ſkin having a peculiar ſympathy with the ſtomach. In this inſtance, however, as in every other operation of the animal economy, moderation muſt be the leading rule; for, although the ſteady and free circulation through the cutaneous veſſels conduces to a ſympathetic ſupport of the action of the ſtomach; yet exceſſive perſpiration, ariſing from over-action of theſe veſſels, is followed by a languor and partial torpor, which is alſo communicated to the ſtomach; inſomuch that ſickneſs, and total loſs of appetite are often the immediate reſults of violent exerciſe, attended with profuſe perſpiration. Regular exerciſe on horſeback has been generally found the moſt effectual means of ſtrengthening the ſtomach, and of curing indigeſtion.

Cold bathing is another important mode of reſtoring both general and local vigour; but unleſs it be reſorted to with ſome diſcrimination, like other active agents upon the animal frame, it may be productive of much detriment. In order to obtain benefit from the external application of cold, a certain degree of vigour in the circulation, eſpecially in the veſſels of the ſkin, ſhould be preſent. In the dyſpeptic ſtate, the temperature of the ſkin is liable to be defective, and the cutaneous circulation to be feeble; and under ſuch circumſtances, ſo far from giving ſtrength to the conſtitution, or to the ſtomach, the powers of life are depreſſed by the uſe of the cold bath, and the digeſtive organs ſympathize in the torpor, produced in the ſkin. The tepid or warm bath is more beneficial when this condition of the ſyſtem exiſts, and the baths of Buxton and Matlock may be reſorted to with advantage; the ſame principle, however, muſt be kept in view in the uſe of theſe; which muſt not be entered with a chilly and ſhuddering ſurface; nor the immerſion be repeated, if a glow does not ſucceed. See COLD, *as a remedy*.

In conſequence of the great ſympathy between the ſtomach and the ſkin, the proper regulation of the *clothing* is a matter of conſiderable importance to thoſe who are liable to indigeſtion; and as the temperature, though variable, is moſt frequently below the ſtandard of health, ſo in general warmth is a neceſſary quality to be maintained. This is moſt particularly required in the extremities, in which the circulation is neceſſarily moſt languid, in conſequence of the greater diſtance from the heart; warmth and dryneſs of the feet, therefore, are peculiarly ſerviceable in the cure and prevention of dyſpepſia; and for thoſe whoſe temperature is eaſily diminiſhed by external cold, the general ſtimulus and ſlow-conducting power of woollen garments, worn next the ſkin during the winter months, may be conſidered as affording much ſecurity from the attacks of indigeſtion. But as profuſe perſpiration is generally accompanied by ſome degree of ſympathetic debility in the ſtomach, theſe garments ſhould not be uſed, during the hot ſeaſons, by thoſe whoſe ſkin is readily brought into a perſpirable ſtate.

A relaxation of the mind from the anxieties of buſineſs and the fatigues of ſtudy, and the purſuit of objects of amuſement, contribute materially to the well-being of the animal economy, and eſpecially to the proper performance of the digeſtive functions. This object is more particularly to be conſidered, when there is a tendency to hypochondriaſis. And as we have already obſerved, it is probably from the amuſements and regular exerciſe, which are generally enjoyed at watering places, as they are called, that more benefits accrue to the dyſpeptic invalids, than from the virtues of the mineral ſprings, theſe places of reſort may be recommended.

Before we conclude this topic, it may be proper to ſtate, that ſeveral contemporary phyſicians and ſurgeons have obſerved, that a diſordered condition of the digeſtive organs, however induced, becomes the cauſe of many ſecondary diſeaſes, both general and local; ſuch as ſuperficial ulcerations, pains, tumours, &c.; which ſpontaneouſly ceaſe, when the diſorder of the digeſtive organs is removed. We may remark, however, that it is not every diſorder of digeſtion which is followed by theſe conſequences; and that it is rather in the morbid condition of the *biliary* ſecretion, than of the ſtomach itſelf, that the diſorder alluded to conſiſts. Its ſymptoms are thus deſcribed by Mr. Abernethy. "This ſlighter diſorder of the chylopoietic organs is, in general, manifeſted by a diminution of the appetite and digeſtion, flatulence, and an unnatural colour and fœtor of the excretions, which are generally deficient in quantity. The tongue is dry, whitiſh, or furred, particularly at the back part: this ſymptom is moſt apparent in the morning. The fur is greateſt at the back part, and extends along the middle of the tongue to the tip, the edges remaining clean. As the diſeaſe advances, a tenderneſs is felt when the epigaſtric region is compreſſed, and the patient breathes more by the ribs, and leſs by the diaphragm, than in the healthy ſtate. The urine is frequently turbid." (Abernethy on the Conſtitut. Origin of Local Diſ.) In whichſoever of the organs concerned in digeſtion this morbid condition may be principally ſeated, the others participate, and various effects follow, in the manner thus deſcribed by Mr. Abernethy. "It is generally admitted, that diſorders of the chylopoietic viſcera will affect the ſource of ſenſation, and conſequently the whole body; but the variety of diſeaſes, which may reſult from this cauſe, has not been duly weighed and reflected on. It may produce, in the nervous ſyſtem, a diminution of the functions of the brain, or a ſtate of excitation, cauſing delirium; partial nervous inactivity and inſenſibility, or the oppoſite ſtate of irritation and pain. It may produce, in the muſcular ſyſtem, weakneſs, tremors, and palſy; or the contrary affections of ſpaſm and convulſions. It may excite fever, by diſturbing the actions of the ſanguiferous ſyſtem; and cauſe various local diſeaſes, by the nervous irritation which it produces, and by the weakneſs which is conſequent on nervous diſorder or imperfect chylification. Or if local diſeaſes occur in a conſtitution deranged in the manner which I have deſcribed, they will become peculiar in their nature and progreſs, and difficult of cure. Affections of all thoſe parts which have a continuity of ſurface with the ſtomach, as the throat, mouth, lips, ſkin, eyes, noſe, and ears, may be originally cauſed or aggravated by this complaint." Whenever, therefore, local diſeaſes are connected with this ſlight derangement of the digeſtive organs, the firſt care will be to correct this derangement, as the moſt important ſtep towards the cure of the former. For while the ſecretion of bile is either defective, or depraved in quality, (of which the appearances of the alvine diſcharge afford the beſt index,) the local or general ſymptoms of diſorder, connected with this condition of the hepatic function, will not yield to remedies that would otherwiſe ſeem to be appropriate, and readily effect a cure.

INDIGETES, a name which the ancients gave to ſome of their gods.

There are various opinions about the origin and ſignification of this word; ſome pretending it was given to all the gods in general; and others only to the ſemi-gods, or great men deified. Others ſay it was given to ſuch gods as were originally of the country, or rather ſuch as were the gods of the country that bore this name; and others again hold, it was aſcribed to ſuch gods as were patrons and protectors of particular cities.

Laſtly, others hold indigetes to be derived from *inde genitus*, or *in loco degens*, or from *inde* and *ago*, for *dego, I live, I inhabit;* which laſt opinion ſeems the moſt probable.

In effect it appears, 1. That theſe indigetes were alſo called *local gods*, *dii locales*, or *topical gods*, which is the ſame thing. 2. The indigetes were ordinarily men deified, who indeed were, in effect, local gods, being eſteemed the protectors of thoſe places where they were deified; ſo that the ſecond and third opinion are very conſiſtent. 3. Virgil joins *patrii* with indigetes, as being the ſame thing, Georg. i. ver. 498. *Dii patrii*, indigetes. 4. The gods to whom the Romans gave the name indigetes were, Faunus, Veſta, Æneas, Romulus, all the gods of Italy; and at Athens, Minerva, ſays Servius; and at Carthage, Dido. It is true, we meet with Jupiter *indiges*; but that Jupiter *indiges* is Æneas, not the great Jupiter; as we may ſee in Livy, lib. i. cap. iii. in which laſt ſenſe Servius aſſures us, *indiges* comes from the Latin *in diis ago, I am among the gods.*

Among theſe indigetes gods, there is none more celebrated, nor more extenſively worſhipped, than Hercules.

INDIGHIRKA, in *Geography*, a river of Ruſſia, which riſes in nearly 64 N. lat., in the Stanovoi-Krebet, and being reinforced by the Amekon and a multitude of ſmaller rivers, falls, in four great arms, into the Frozen ocean, N. lat. 73° E. long 144° 14′.

INDIGNATORIUS, in *Anatomy*, a muſcle thus called, as being ſuppoſed to draw the eye from its inner corner outwards, which gives an appearance of ſcorn and anger.

But this is properly a compound motion of two muſcles; for which, ſee EYE.

This muſcle is called by others the rectus exterior, and abducens; and by Albinus, the abductor. It is one of his quatuor recti oculi.

INDIGO, or ANIL, *Botany*. See INDIGOFERA.

From this plant is extracted a dyer's drug, of a deep blue colour, brought hither from the Weſt Indies and America. It is alſo made in the Eaſt Indies, particularly in the dominions of the Great Mogul, the kingdom of Golconda, &c.

The ancients were acquainted with the dye, which we call indigo, under the name of "Indicum." Pliny knew that it was a preparation of a vegetable ſubſtance, though he was not juſtly informed concerning the plant itſelf, and the proceſs by which it was fitted for uſe. From its colour, and the country from which it was imported, it is denominated by ſome authors "Atramentum Indicum" and "Indicum nigrum." Even at the cloſe of the 16th century it was not known in England what plant produced indigo. Gerarde, in 1597, is wholly ſilent about it, and ſo is Johnſon in 1632. Parkinſon, however, in 1640, treats largely of it. He calls it "Indico or Indian woade," and gives a figure of the leaf from De Laet. He then deſcribes it, firſt from Francis Ximenes in De Laet's deſcription of America; and ſecondly, from Mr. William Finch, a London merchant, in Purchas's Pilgrims. Even in 1688 Mr. Ray ſays it was not agreed among botaniſts what plant it is from which indigo is made; but that the moſt probable opinion was, that it is a leguminoſe ſhrub, allied to Colutea. He deſcribes it from Hernandez and Margraaf; and ſubjoins that of the "Ameri" from the Hortus Malabaricus. *Nil* or *Anil* is the American name. In Arabic it is *Nile*. The Portugueſe have adopted their *Anil* or *Anileira* from the American. The other European nations generally call it *Indigo*. In Chineſe it is *Tien laam*, which ſignifies ſky-blue. Mr. Miller cultivated the dyer's indigo ſo long ago as the year 1731; and calls it Guatimala indigo, ſaying that with us it is an annual plant. Specimens of the *Indigofera tinctoria*, or dyer's indigo, from different parts of India, Madagaſcar, Java, Ceylon, &c. vary very much, if they are all really the ſame ſpecies. Linnæus ſays that it is almoſt an exotic in Ceylon, but frequent in Paliacotta and Coromandel. According to Loureiro it is ſpontaneous in China and Cochinchina, and is cultivated all over thoſe vaſt empires. Dr. Patrick Browne, beſides the wild indigo already mentioned, has two others, which he calls the indigo, and the Guatimala indigo; the former yielding more of the dye than either of the others, is generally preferred, though ſubject to many more miſchances.

It has been generally believed, that the indigo plant flouriſhes only in the climate of the torrid zone, and in thoſe parts of the temperate zone which are near the tropics. But experiments lately made in Italy by Bruley, by order of government, have proved that, in a ſuitable ſoil and expoſure, and with good ſeed, it may be cultivated in a ſoutherly climate. Accordingly, he has obtained the indigo plant in the gardens of the Chateau de la Venerie, near Turin; and by ſubmitting it to the proceſs employed at St. Domingo, he has extracted an indigo which might bear compariſon with the fineſt indigo of the colonies. His plantations were made towards the end of February. M. Icard de Bataligni, another coloniſt, cultivated the plant in 1805, in the department of Vaucluſe, in France; and his reſults confirm the hopes formed with reſpect to the culture of indigo in Europe.

Labat has given a particular account of the culture of the plant, and the preparation of the indigo. The ground being thoroughly cleared from weeds (one of the principal points in the culture), and, we may add, drained, a number of ſlaves, ranged in a line, march acroſs, making little trenches of the width of their hoes, and two or three inches deep, about a foot diſtance from one another every way: then, returning, they drop ſome ſeeds in each trench, and afterwards cover them with the earth taken out. The ſoil, it is obſerved by others, ſhould be free and rich, and the climate warm: and the ſeaſon of ſowing ſhould be rainy; as the earth muſt either already have imbibed water, or rain muſt ſpeedily follow the ſowing; otherwiſe the ſeed becomes heated, corrupts, and is loſt, after all the labour it has occaſioned. During the proceſs of vegetation the ground muſt be carefully weeded, in order to prevent any mixture of herbs, which would injure the indigo in its manufacture. In moiſt weather, the plant comes up in three or four days; and in about two or three months after, it is fit for cutting: if ſuffered to ſtand till it runs into flower, the leaves become too dry and hard, and the indigo obtained from them proves leſs in quantity, and leſs beautiful: the due point of maturity is known, by the leaves beginning to grow leſs ſupple, or more brittle. In rainy ſeaſons, the cutting may be repeated every ſix weeks: cutting in dry weather kills the plant, which, if that is avoided, continues to afford freſh crops for two years.

A large quantity of the herb is put into a vat or ciſtern of ſtrong maſon work, with ſo much water as is ſufficient to cover it; and ſome wood laid above to prevent its riſing up. The matter begins to ferment, ſooner or later, according to the warmth of the weather, and the maturity of the plant, ſometimes in ſix or eight hours, and ſometimes not in leſs than twenty. The liquor grows hot, throws up a plentiful froth, thickens by degrees, and acquires a blue colour, inclining to violet. In proportion as the caloric increaſes, azote is diſengaged, the herbaceous mucilage ſeparates, the vegetable is diſcompoſed, and the mixture abſorbs oxygen. The fermenting fluid paſſes from a green to a violet tinge, and this by degrees changes to a blue colour. The great art of the manufacturer is to check the fermentation at a proper degree. If the fermentation is too feeble or too brief, the plant remains impregnated with much eſſential ſalt, which diminiſhes the quantity of indigo. If it be too long, the tender extremities of the plant undergo a putrefaction which deſtroys the colour. Some years ago, the following criterion was publiſhed at St. Domingo, for aſcertaining invariably the correct fermentation of the indigo. It is only requiſite to write on white paper with the matter to be examined. If this ink be of very high colour, it is a proof that the fermentation is not yet at its true point. The experiment is repeated every quarter of an hour, till it is perceived that the liquid has loſt its colour. This was pronounced an infallible index to ſhew the true point of fermentation. Others, however, judge of the proper ſtage of fermentation by means of a ſilver cup, into which they throw the liquid, ſhaking it till grains are formed; by their quality, and that of the fluid, they judge of the fermentation. When the feculent particles begin to precipitate to the bottom of the cup, it is then judged, that the herbs have attained the true degree of maceration for obtaining indigo. It has been obſerved, however, that this procedure often led into error; and, therefore, five or ſix minutes after the liquid has been put into the cup, it was perceived to form round its ſides a cordon of feculæ, or ſediment, at firſt of a green colour, and then blue. When the maceration is not at the requiſite point, this cordon, or girdle, detaches itſelf with difficulty from the ſides of the cup, but finally precipitates, and concentres at the bottom, always towards the centre, and the water above it becomes limpid, though of a yellowiſh tinge. When theſe ſigns are perceived, they indicate infallibly the ſucceſs of the firſt operation. At this time, without touching the herb, the liquor impregnated with its tincture is let out, by cocks in the bottom, into another vat placed for that purpoſe, ſo as to be commanded by the firſt. The firſt vat is called the “ſteeper;” the ſecond and third are called the “beaters.”

In the ſecond vat, the liquor is ſtrongly and inceſſantly beat and agitated, with a kind of buckets fixed to poles, till the colouring matter is united into a body. A good deal of nicety is requiſite in hitting this point; if the beating is ceaſed too ſoon, a part of the tinging matter remains diſſolved in the liquor; if continued a little too long, a part of that which had ſeparated is diſſolved afreſh. The exact time for diſcontinuing the proceſs is determined by taking up ſome of the liquor occaſionally in a little cup, and obſerving whether the blue fecula is diſpoſed to ſeparate and ſubſide.

The facility with which the grain precipitates to the bottom of the beater, is an unequivocal ſign that the beating has arrived at the correct point.

The whole being now ſuffered to reſt till the blue matter has ſettled, the clear water is let off, by cocks in the ſides at different heights; and the blue part diſcharged by a cock in the bottom, into another vat. Here it is ſuffered to ſettle for ſome time longer, then farther drained in cloth-bags, or ſacks, and expoſed in ſhallow wooden boxes to the air, without expoſing it to the ſun, and carefully keeping it from the rain, till thoroughly dry.

Before it is perfectly dry, it is cut in ſmall pieces of an inch ſquare, which detach themſelves readily from the box, when the indigo is entirely dry. Yet, however well drained and dried the indigo may be, it always experiences, in the firſt months of its fabrication, a diminution ſufficiently evident to warrant a haſtening of the ſale. It is cuſtomary to pack the indigo in barrels, and thus to circulate it in commerce. Indigo is packed in ſacks of coarſe linen, and the ſack is covered with an ox's hide, ſo hermetically ſewed, that nothing can penetrate it. Theſe packets are called “ceroons.” They are much preferable to barrels, as they are more ſolid and more convenient for tranſportation. Two “ceroons” make the load of one animal.

The author above-mentioned, from whom the greateſt part of the foregoing account is extracted, obſerves farther, that the goodneſs of the indigo depends greatly upon the age of the plant; that before it has grown fully ripe, the quantity it yields is leſs, but the colour proportionably more beautiful; that probably the ſecret of thoſe whoſe indigo has been moſt eſteemed, is no other than cutting the herb at the time when it yields the fineſt colour; that the ſuperiority of ſome of the indigoes of the Eaſt Indies to thoſe of America, is perhaps owing to the former being prepared more curiouſly from only the leaves of the plant; and that by beating the herb in the ſteeping-vat, which has been practiſed by ſome with a view to increaſe the quantity, great part of the ſubſtance of the leaves and bark is blended with the water along with the colouring matter, and the indigo extremely debaſed.

It is ſaid that lime, or lime-water, is ſometimes employed in the beating-vat, to promote the ſeparation of the tinging particles from the water; and that the hardneſs or flintineſs of ſome ſorts of indigo is owing to an over proportion of this addition.

Pomet ſays, that the Indians of the village of Sarqueſſe, near Amadabat, uſe only the leaves of the indigo, and throw away the plant and branches; and from thence the moſt eſteemed indigo is brought.

Indigo is commonly divided, from the colour which it exhibits upon breaking, into three kinds, copper-coloured, purple, and blue. It is ſaid that the dyers uſe chiefly the firſt; and the calico-printers (for this drug gives a durable ſtain to linen as well as woollen) the laſt. On what particular circumſtances theſe different appearances depend, we know not; nor is it certainly known whether the real quality of the indigo has any connection with them. The deepeſt and livelieſt blue indigo, rubbed with the nail, appears like poliſhed copper; and ſolutions of all the ſorts, made in alkaline lixivia, aſſume alike a copper-coloured ſkin upon the ſurface.

Good indigo is moderately light, breaks of a ſhining ſurface, and burns almoſt wholly away upon a red-hot iron. It is quickly penetrated by water, and reduced into a kind of paſte; a conſiderable part is at the ſame time diffuſed through the liquor, and very ſlowly ſubſides. This is probably what Labat and Hellot mean by its diſſolving in water; for no part of the indigo really diſſolves; it cannot indeed be expected that it ſhould, from the proceſs by which it is obtained.

Indigo requires an equal quantity or more of fixed alkaline ſalt, to render it totally ſoluble in water. On digeſting the indigo, with a gentle heat, in the ſolution of the alkaline ſalt, a ſhining copper-coloured ſkin begins to appear, and gradually covers the whole ſurface: on agitating the matter, a large blue flower or froth ariſes, and the liquor underneath appears of a deep green. If woollen cloth, without any other preparation than moiſtening it with warm water, be dipped in this hot liquor, it comes out perfectly green, and changes almoſt inſtantly in the air to a fine blue. This is the common proceſs of dyeing blue.

Mr. Hellot deſcribes two indigo vats with urine; one of which is uſed hot, like the foregoing, and the other cold. The hot vat conſiſts of equal parts of indigo, alum, and tartar, digeſted in urine till the liquor becomes green. The cold one is prepared, by digeſting powdered indigo with vinegar for twenty-four hours, in the proportion of four pounds to about three quarts; then mixing the matter with about fifty gallons of urine, and ſtirring the whole together every night and morning, till the liquor turns green, and gathers a head like the common vat.

Indigo is fitted for printing on linen, by diluting it with water into the conſiſtence of a ſyrup; then adding ſome powdered pearl-aſhes, green vitriol, and lime newly ſlaked; with ſo much water, occaſionally, as will reduce them into the conſiſtence of thin paint; mixing the whole thoroughly together, and ſtirring the matter every now and then, till it gains a copper colour on the ſurface. The proportions uſed by the workmen are, two parts of indigo, one of pearl-aſhes, three of vitriol, and two of lime. The ſame compoſition, diluted with a ſufficient quantity of water (about ſix gallons to a pound of indigo), and boiled, gives a durable blue to tanned ſkins, whether dipped in hot or cold

Indigo digeſted in a moderate heat with different volatile alkaline ſpirits, gave only yellowiſh and browniſh red tinctures; with rectified ſpirit of wine, a reddiſh one; to lime-water, and to water acidulated with the vitriolic, nitrous, and marine acids, it gave no tincture at all.

The concentrated vitriolic acid unites with it into a ſmooth paſte, eſpecially if the indigo is previouſly well ground with powdered glaſs, ſand, or other like ſubſtances. The indigo is thus rendered ſoluble in boiling water along with the acid, ſo as to paſs through the pores of a filter; the ſolution, whilſt hot, appears of a deep bright green colour, like that made by fixed alkalies, but fades as it grows cold, and changes at laſt to a browniſh. Theſe experiments, which were many times repeated with the ſame event, ſeem to overturn Mr. Hellot's ingenious theory, which deduces the green colour of ſolutions of indigo from the common property of blue juices being turned green by alkalies; and the blue colour which the cloth acquires ſoon after it is taken out of the vat, from a ſeparation of the alkali. We here find, that a green ſolution of this concrete is obtainable by the ſtrongeſt of the acids, and that with volatile alkalies it diſcovers no tendency to greenneſs.

For the method of preparing SAXON *blue* and SAXON *green* from indigo, ſee thoſe articles.

Indigo is ſometimes uſed among the painters for paper-hangings, and ſuch groſs uſes, who grind and mix it with white to make a blue colour; for without that mixture it would paint blackiſh.

They alſo mix it with yellow to make a green colour. It is alſo uſed in dyeing, and by the laundreſſes, to give a blueiſh caſt to their linen.

In the Hortus Indus Malabaricus is an account of the plant whence indigo is drawn; the decoction of whoſe root is ſaid to be excellent againſt nephritic colics; its leaves, applied to the abdomen, good to promote urine; and the indigo itſelf is ſaid to be of good uſe in drying of tumours.

Some phyſicians have recommended indigo in the quantity of a drachm, while others look upon it as a poiſon; and in Saxony the internal uſe of it is prohibited.

INDIGO, *Baſtard.* See AMORPHA.

INDIGO *Mills.* For the purpoſe of effecting the ſolution and union of indigo with the liquid uſed along with it, for the purpoſes of dyeing, mills of various conſtructions are in uſe. In this proceſs trituration or friction is as much as poſſible avoided, and the pulverization is effected merely by bruiſing. For this two very ſufficient reaſons may be aſſigned; the firſt, in point of economy, and the ſecond, to avoid chemical inconveniency. On whatever ſubſtance the indigo was triturated or rubbed, a certain proportion of the ſtuff would be mixed or incorporated along with the pulverized indigo, and that proportion of indigo which was abſorbed by this ſtuff would be either totally loſt, or brought into union with another ſubſtance which might prove uſeleſs, and probably injurious in the ſubſequent proceſs of dyeing. If the former only was the caſe, the abſorbed indigo would be totally loſt; if the ſecond took place, the whole proceſs might be utterly ſpoiled by the combination. In the appropriate plate, *fig.* 1. repreſents the ground or horizontal plan of ſuch an indigo mill as is generally uſed in ſmall dye-works, and which is occaſionally turned by a man's or boy's hand. This is tedious and laborious, for the operation muſt be continued for a very long time before the indigo is ſufficiently mixed with the liquid to be fit for uſe, and only a ſmall quantity can be put into the veſſel at once. *Fig.* 2. is an elevated ſection of the ſame mill.

In this machine the pulverization or granulation of the indigo is effected by the preſſure of a number of ſmooth caſt-iron balls, like thoſe uſed for the ſhot of great guns, which, being rolled among the indigo, preſs it into a paſte by their weight, until it unites with the liquid by which it is to be held in ſolution.

In *fig.* 1, A repreſents the bottom and rim of the veſſel which contains the indigo; and which is of a cylindrical form. B is an upright ſpindle, which, in this figure, does not appear. Upon the ſpindle B is fixed a wheel C C, with a convenient number of arms projecting round the veſſel, like the radii of a circle; and below each of theſe arms are projecting pieces of iron, like the pins or teeth of a harrow, for moving the balls. When this wheel C is moved round its axis, the whole balls in the veſſel A are ſet in motion, and, by rolling over the indigo, gradually preſs it, until it unites with the water or liquid with which it is ſurrounded. If the bottom of the cylinder be flat, a very ſmall part of the ſurface of each ball can act upon the indigo; but by caſting circular hollow grooves, as repreſented in *fig.* 2, nearly the ſemi-diameter of the ball will preſs upon the ſtuff. The mill is moved by a handle D, *fig.* 2, which ſets in motion the ſmall bevel wheel E, and this wheel acting upon the horizontal wheel F, fixed upon the ſpindle B, ſets it alſo in motion, and conſequently the wheel C C is moved round its axis, and all the balls roll round upon the indigo. G is a croſs ſhaft upon the top of the ſpindle B, loaded at each end with a heavy ball. There is generally another ſhaft placed at right angles to this, when they aſſiſt in regulating and equalizing the motion in the ſame manner as any other fly wheel. When the indigo is found to be ſufficiently diſſolved, and united with the water, the liquid thus formed is drawn off into any other veſſel for uſe by means of a vent and ſpiggot placed in any convenient part of the bottom of the veſſel.

The great labour and time which it requires, and the ſmall quantity of ſtuff which can be prepared at once by a machine of this kind, renders it ill adapted for the uſe of large works where much indigo is conſumed, and where they have generally a horſe-power water-wheel, or ſteam-engine, for raiſing water, cutting madder, and other purpoſes neceſſary in extenſive works. *Fig.* 3. repreſents an elevated croſs ſection of one of theſe machines, driven by any moving power, and capable of preparing a very great quantity of indigo at all times, as it requires no attendance, excepting to empty the veſſel when the indigo is wanted, and add a freſh ſupply. H is a ſemi-circular veſſel of caſt-iron, placed upon a ſtrong wooden frame O, and of any convenient length. I is a cover made in two pieces, with a circular aperture to admit the upright ſhaft K working upon the centre, or pivot P. At Q, the upright P is jointed to a horizontal ſhaft of wood M, the other end of which is connected by the joint R, with a crank fixed on the end of a horizontal ſhaft N driven by the moving power. The circular motion of the ſhaft and crank N communicates an alternate, or reciprocating motion, by means of the horizontal connecting ſhaft M, to the upper end of the upright ſhaft K, which vibrating upon the centre joint P, ſets in motion the iron cylinders L, L, in the body of the veſſel, which preſs upon the indigo, and produce the ſame effect, but to a much greater extent, as the balls in the machine firſt deſcribed. The cylinders L, L, may be made of any diameter or length which is found convenient. The greater maſs of iron that they contain, the quicker and more effectual will be their operation upon the ſtuff, provided there is a ſufficient power to drive them. The frame under the joint P extends the whole length of the ſemi-circular veſſel H, which may be any length, according to the extent of the power and quantity of work required. As this machine requires no attention whatever, it is found very uſeful in large dye works, as, by means of it, they can conſtantly command a large ſupply of prepared indigo, which may be drawn off when wanted, for the longer it is under the preparing proceſs, the better in every reſpect, and freſh indigo may be added as the ſupply gets low.

INDIGOFERA, in *Botany*, yields the blue dye called Indigo or Indicum, ſo eminently uſeful in dyeing various manufactures of a blue colour. This ſubſtance obtained the name of indigo from its native country, India.—Linn. Gen. 383. Schreb. 506. Willd. Sp. Pl. v. 3. 1220. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 67. Juſſ. 359. Lamarck Dict. v. 3. 244. Illuſtr. t. 626. Gærtn. t. 148. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſpreading, almoſt flat, five-toothed. *Cor.* papilionaceous; ſtandard rounded, reflexed, emarginate, ſpreading; wings oblong, obtuſe, ſpreading at the lower margin, of the ſhape of the ſtandard; keel obtuſe, ſpreading, deflexed, marked on each ſide by an hollow awl-ſhaped point. *Stam.* Filaments in two bundles, diſpoſed into a cylinder, aſcending at their tips; anthers ſomewhat roundiſh. *Piſt.* Germen cylindrical; ſtyle ſhort, aſcending; ſtigma obtuſe. *Peric.* Pod roundiſh, long. *Seeds* numerous, kidney-ſhaped.

Eſſ. Ch. Calyx ſpreading. Keel of the corolla having an awl-ſhaped ſpur on each ſide! Pod linear.

Obſ. Till within the laſt century it was but imperfectly made out what plants produced the dye known to the Romans by the name of *Indicum*. Mr. Miller, however, cultivated the *Indigofera* ſo early as 1731; but he was acquainted with only five ſpecies of it; which ſame number Linnæus imperfectly deſcribed. Profeſſor Martyn enumerates thirty-five ſpecies, and Willdenow fifty-one; but ſince this genus is particularly known and eſteemed for its utility in the arts, and that moſt of its ſpecies yield the blue dye, as well as many other plants of the ſame natural family, we ſhall merely give a general outline of the genus, without entering into a long ſyſtematic arrangement of the ſpecies.

The genus *Indigofera* is compoſed of ſhrubs and herbs, whoſe leaves are, in certain caſes, ſimple, more generally ternate, but moſt frequently unequally pinnate. The leaflets in ſome ſpecies are jointed and awned at the baſe. Stipulas diſtinct from the leaf-ſtalk. Peduncles axillary, generally many-flowered, in ſpikes or bunches. Many ſpecies are natives of the Cape of Good Hope; for inſtance, I. *filifolia*, *ſericea*, *depreſſa*, *ovata*, *pſoraloides*, *candicans*, *amæna*, *incana*, *procumbens*, *ſarmentoſa*, *denudata*, *erecta*, *coriacea*, *filiformis*, *digitata*, *fruteſcens*, *ſtricta*, *anguſtifolia*, and *capillaris*.—The reſt are either from the Eaſt or Weſt Indies, Arabia Felix, New Holland, and the coaſt of Guinea.

It is ſaid that Pliny was aware that *Indicum* was a preparation from a vegetable ſubſtance, though he was ill-informed both concerning the plant itſelf, and the proceſs by which it is made fit for uſe. The following is a curious anecdote to ſhew that at the cloſe of the 16th century it was unknown in England what plant produced Indigo, for in a book entitled "Remembrances for Maſter S. by Richard Hakluyt," written in 1582, Maſter S. is inſtructed "to know if Anile that coloureth blew, be a natural commodity of Turkey, and if it be compounded of an herbe—to ſend the ſeed or root with the order of ſowing, &c.—that it may become a natural commodity in the Realm, as woad is (*Iſatis tinctoria*), that the high price of foreign woad may be brought down."

I. *tinctoria*, Dyer's Indigo, is a native of the Eaſt and Weſt Indies, Madagaſcar, Ceylon, Java, &c. Its ſtem is ſuffruticoſe. Leaves pinnate, ovate. Bunches of flowers ſhort.—Loureiro ſays it is cultivated all over the vaſt empires of China and Cochin-china. It is figured under the name of Ameri in the *Hortus Malabaricus*, v. 1. 101. t. 54.

INDIGOFERA. See SOPHORA.

INDIKKOOD, in *Geography*, a town of Grand Bucharia; 60 miles W. of Balk. N. lat. 36° 38′. E. long. 64° 10′.

INDION, a town of Perſia, in the province of Choraſan, near the Masjan; 210 miles N.N.E. of Herat.

INDIRECT MODES *of Syllogiſms*, in *Logic*, are the five laſt modes, or moods, of the firſt figure, expreſſed by the barbarous words *baralipton, celantes, dabitis, feſpame, freſiſom*.

It is the converſion of the concluſion which renders the moods indirect: for inſtance, a ſyllogiſm in darii, and another in dabitis, would be perfectly alike, were it not for that converſion; the propoſitions having the ſame quantity, and the ſame quality, and the middle term being the ſubject in the major, and the attribute in the minor, in both. It remains, then, that, to make a diſtinction, that which is the ſubject of the concluſion in darii, be the attribute in the concluſion of dabitis; and that which is the attribute in the firſt, the ſubject in the laſt. See SYLLOGISM.

DA- Every thing that promotes ſalvation is advantageous:
RI- There are afflictions which promote ſalvation:
I. Therefore there are afflictions which are advantageous.
DA- Every thing that promotes ſalvation is advantageous:
BI- There are afflictions which promote ſalvation:
TIS. Therefore ſome things promoting ſalvation are afflictions.

INDIRECT *Confirmation*. See CONFIRMATION.

INDISCERNIBLES, in the *Philoſophy of Leibnitz*. See LEIBNITZIAN *Philoſophy*.

INDIVIDUAL, INDIVIDUUM, in *Logic*, a particular being of any ſpecies; or that which cannot be divided into two or more beings, equal or alike.

The uſual diviſion in logic is made into genera or genuſes, thoſe genera into ſpecies, and thoſe ſpecies into individuals. See GENUS, SPECIES, and DIVISION.

The ſchoolmen make a four-fold diſtinction of individuals; *viz*.

INDIVIDUUM *Vagum*, that which, though it ſignifies but one thing, yet may be any of that kind; as when we ſay a man, a certain perſon, or one ſaid ſo and ſo; though but one perſon is meant, yet that perſon, for aught that appears to the contrary, may be any body.

INDIVIDUUM *Determinatum* is, when the thing is named and determined; as Alexander, the river Nile, &c. this is alſo called *individuum ſignatum*.

INDIVIDUUM *Demonſtrativum* is, when ſome demonſtrative pronoun is uſed in the expreſſion; as, *this man, that woman*.

INDIVIDUUM *ex Hypotheſi*, or by ſuppoſition, when an univerſal name or term is reſtrained, by the ſuppoſition, to a particular thing: as when we ſay, the ſon of ſuch a one, and it be known that he had but one ſon.

INDIVISIBLES, in *Geometry*, thoſe indefinitely ſmall elements, or principles, into which any body or figure may be ultimately reſolved.

A line is ſaid to conſiſt of points, a ſurface of parallel lines, and a ſolid of parallel and ſimilar ſurfaces; and becauſe each of theſe elements is ſuppoſed indiviſible, if in any figure a line be drawn through the elements perpendicularly, the number of points in that line will be the ſame as the number of the elements.

Whence it appears, that a parallelogram, priſm, or cylinder, is reſolvable into elements, as indiviſible, all equal to each other, parallel, and like to the baſe; and a triangle into lines parallel to the baſe, but decreaſing in arithmetical proportion; ſo alſo are the circles which conſtitute the parabolic conoid, and thoſe which conſtitute the plane of a circle, or the ſurface of an iſoſceles cone.

A cylinder may be reſolved into cylindrical curve ſurfaces, having all the ſame height, and continually decreaſing inwards, as the circles of the baſe do, on which they inſiſt. This way of conſidering magnitudes, is called the method of indiviſibles, which is only the ancient method of exhauſtions, a little diſguiſed and contracted.

It is found of good uſe in ſhortening mathematical demonſtrations; of which we may give an inſtance in that famous propoſition of Archimedes, that a ſphere is two-thirds of a cylinder circumſcribing it.

Suppoſe a cylinder, an hemiſphere, and an inverted cone (*Plate* VIII. *Geometry, fig.* 102.) to have the ſame baſe and altitude, and to be cut by infinite planes all parallel to the baſe, of which $d g$ is one; it is plain, the ſquare of $d h$ will every where be equal to the ſquare of $k c$ (the radius of the ſphere) the ſquare $h c = e h$ ſquare; and, conſequently, ſince the circles are to one another as the ſquares of the radii, all the circles of the hemiſphere will be equal to all thoſe of the cylinder, deducting thence all thoſe of the cone; wherefore the cylinder, deducting the cone, is equal to the hemiſphere; but it is known, that the cone is one-third of the cylinder, and conſequently the ſphere muſt be two-thirds of it.

Cavalleri was the firſt perſon who introduced this method of indiviſibles into one of his works, entitled "Geometria Indiviſibilium," printed in 1635; which he alſo made uſe of in another tract publiſhed in 1647.

INDIVISO.—*Pro* INDIVISO. See PRO.

INDIVISUM FOLIUM. See LEAF.

INDO-SCYTHIA, in *Ancient Geography*, a diſtrict of India, that lay on the weſtern ſide of the river Indus, extending as far as the river Coas, or Cow river, and at preſent inhabited in part by thoſe who are probably deſcendants of the Scythian Nomades, and called *Nomurdy*.

INDOCTORUM PARLIAMENTUM. See PARLIAMENTUM.

INDORE, in *Geography*, a town of Hindooſtan, in the Malwa country, and reſidence of a Mahratta chief; 290 miles S.S.W. of Agra. N. lat. 22° 56′. E. long. 76° 11′.

INDORSEMENT, any thing written on the back of a deed or inſtrument. See ENDORSING.

A condition written on the back of an obligation is commonly called an indorſement: from *in*, and *dorſum*, *back*.

INDORSEMENT *of a Bill of Exchange*. See ENDORSEMENT.

INDOS, in *Geography*, a town of Hindooſtan, in Bengal; 16 miles E.N.E. of Biſſunpour. N. lat. 23° 10′. E. long. 87° 53′.

INDOUR, a town of Hindooſtan, in Tellingana; 15 miles N.W. of Indelavoy.

INDRA, in *Mythology*, is deemed, among the Pagan Eaſt Indians, the firſt of the demi-gods; and ſeems generally to rank in importance next to the three chief deities that form the Hindoo Trimurti. (See TRIMURTI.) The hiſtory of this firſt of their *dii minores* might be extended through ſeveral volumes; and, indeed, including the fables connected

connected with the motley hiſtory of this perſonage, many volumes thereon are extant among the Hindoos. He is ſaid, in their theogony, to be the offspring of Kaſyapa and Aditi (ſee KASYAPA), and has the whole firmament under his regency. In many particulars he correſponds with the Joves or Jupiters, for there were a great many among the Greeks and Romans; more eſpecially, perhaps, with Jupiter Pluvius, for Indra is the god of ſhowers. The Hindoos fancy the viſible heavens to be under the guidance of eight genii, collectively called Marûts, or the Winds. (See MARUT.) Of theſe, Indra is the principal, and he rules the eaſtern quarter. He may be deemed a perſonification of the firmament, ruling all atmoſpheric or meteoric phenomena. As god of thunder he is named Vajra Pani, or Lightning Sender; his diſk-ſhaped weapon, *vajra*, repreſents lightning. He reſides in the celeſtial city Umravati; his palace, Vaijayanta, is ſituated in the garden Nandana, which contains alſo the all-yielding trees Pariyataka, Kalpadruma, and three others ſimilarly bountiful. He poſſeſſes alſo the all-prolific cow Kamdenu, otherwiſe called Surabhi; and hence one of Indra's names means the *lord of wealth*. He has a conſort named Indrani: he rides the elephant Iravat, with three proboſci, which are ſaid to repreſent water-ſpouts, as the bow with which he is armed is the iris. Seated on mount Meru, or the north pole, attended by male and female dancers (Sinàra and Upsàra), he regales the gods with nectar and heavenly muſic. He is painted with four arms, and ſpangled with eyes; hence one of his names is the *thouſand-eyed* god. Another of his names is Purendera, or the *deſtroyer of towns*; he having, in revenge for ſuppoſed neglects, overwhelmed ſeveral cities; particularly Ujaini, or Oojein, the capital of Malwa.

INDRA *Malwa*, the hereditary poſſeſſion of the family of Sindia. The city has now lain ſubmerged about 1900 years. (See OOJEIN.) Indra is alſo named Shatkratû, meaning he to whom is made a *hundred ſacrifices*, for this "king of the immortals," another of his names, is very extenſively propitiated in the numerous ceremonies of luſtration and ſacrifice that Brahmans, devoted to the ſervice of the altar, are daily called upon to obſerve. Jealous, however, of the offerings made to other deities, he is repreſented as frequently interrupting, both by perſonal interpoſition and evil counſel, the ſacrifice prepared or intended for other deities: in this character of an evil counſellor he is uſually called Sakra, and although called and repreſented as *thouſand-eyed*, he is ſometimes painted with but one eye; the cauſe of which, with many other fables connected with the character and hiſtory of this important deity, is related in Moor's Hindoo Pantheon, whence moſt of the particulars of this article are taken.

Like moſt of the other Hindoo deities, Indra is repreſented as immoral and depraved, even to a proverbial degree; but we muſt refer to the work juſt mentioned for inſtances of his profligacy, exceſſively extravagant if received literally, but which, doubtleſs, are allegorical concealments of ſome aſtronomical or phyſical facts; for major Moor proves Indra to be a ſtar or a conſtellation of the northern hemiſphere, and that the wars which he ſuſtains againſt giants, in which he is alternately conqueror and conquered, refer to ſome cycle or periodical revolution of the heavenly bodies. Metallic images of Indra are rarely ſeen: he is ſculptured in Elephanta and other excavations in India, mounted on Iravat, and is often met with in paintings. Several engravings of him are given in the Hindoo Pantheon. Under the words ſeverally referred to above, and the foreign names of perſons and places that occur, farther particulars of the ſubjects of this article will be found; for Indra is ſo important a deity, that his hiſtory, like his worſhip, mixes itſelf with that of moſt of his divine aſſociates in the monſtrous ſyſtem of Hindoo idolatry.

INDRANI, is the name of the Sakti or conſort (ſee SAKTI) of Indra, the regent of the firmament among the Hindoos. (See INDRA.) Her name is ſometimes pronounced Aindrani. She is otherwiſe called Pulomaya, or Powlamya, and Saki, and is repreſented in the Hindoo Puranas, or mythological and theogonical romances, as a faithful and virtuous character, which is not always the caſe with their female divinities: ſhe is alſo very handſome, and has reſiſted many temptations. She is called one of the ſeven divine mothers of the celeſtials. (See MATRI.) In the ſixth volume of the Aſiatic Reſearches, is a very curious and intereſting account by ſir Charles Malet, of the magnificent excavations at Ellora, accompanied by plates; one of them repreſenting Indrani, of lovely form, ſeated on a lion, with a child in her lap, and a ſkull and croſs bones in her girdle: major Moor, however (Hindoo Pantheon, p. 271.), doubts if this elegant figure be really of Indrani, of whom he ſays he never ſaw any ſculptured repreſentation. See ELORA; to our account of which may be added, that Mr. Daniel has engraved and publiſhed, from materials in the collection of ſir Charles Malet, a ſeries of views, both minute and perſpective, of the interior and exterior of theſe wonderful excavations, that is altogether unrivalled by any work in Europe, as well for the accuracy of oriental ſcenery and coſtume, as for its general elegance and ſplendour.

INDRAPOUR, in *Geography*, a town on the W. coaſt of the iſland of Sumatra, and capital of a country, which has ſeveral other towns, where the Dutch have a factory for the purchaſe of pepper, 100 miles N. W. of Bencoolen. S. lat 2°. E. long. 100° 40′. This was once the ſeat of a monarchy of ſome conſideration and extent. Its antiquity appears from an hiſtorical account given by the ſultan of Bantam to Corneille le Brun, in which it is mentioned, that the ſon of the Arabian prince, who firſt converted the Javans to Mahometaniſm, about the year 1400, having got himſelf declared ſovereign of Bantam, married the daughter of the raja of Indrapour, and had, as her portion, the territory of the Sillabares, a people of Banca-houlou. This was probably the firſt diſmemberment which the Javan monarchs long availed themſelves of; and ſince, the kingdom of Indrapour has dwindled into obſcurity. From its ruins has ſprung that of Anacſoongey; extending on the ſea-coaſt from Mandoota river to that of Oori; the preſent capital of which, if ſuch towns deſerve the appellation, is Moco Moco. Marſden's Sumatra, p. 284.

INDRAPOUR *Point*, a cape on the W. coaſt of Sumatra. S. lat. 2° 10′. E. long. 100° 34′.

INDRAT, a town of Hindooſtan, in Dowlatabad; 23 miles N.W. of Beder.

INDRE, a river of France, which riſes about four miles N. N. W. from Bouſſac, in the department of the Creuſe; and joins the Loire at Rigny, between Saumur and Tours.

INDRE, one of the departments of the central region of France, formerly Lower Berri, in N. lat. 46° 45′, ſo called from the river which traverſes it from S.E. to N. W.; bounded on the N. by the department of the Loir and Cher, on the E. by that of the Cher, on the S. by the departments of the Creuſe and Upper Vienne, and on the W. by thoſe of the Vienne and Indre and Loire, about 54 miles from N. to S., and 45 from E. to W. Its capital is Chateauroux. It contains 362 ſquare leagues, and 207,911 inhabitants; it is divided into four diſtricts, *viz.* Iſſoudun, containing 39,341 inhabitants; Chateauroux, 75,588; La Chatre, 45,171; and Le Blanc, 47,811. Its cantons are 23, and communes 275. Its contributions amount to 1,652,606 francs; and its expences to 219,394 fr. 59 cents. The weſtern diſtrict of this department abounds in rocks, pools, and woods; but the other tracts, and in particular that on the right hand of the Indre, conſiſt of cultivated fields, vineyards, &c. yielding grain, wine, and paſtures; it has mines of iron, marble quarries, and mineral ſprings, &c.

Indre *and* Loire, one of the nine departments of the weſtern region of France, formerly Tourraine, in N. lat. 47° 10′, ſo called from the union of the two rivers: bounded on the N. by the department of the Sarte, on the E. by the departments of the Loire and Cher and the Indre, on the S. and S.W. by the department of the Vienne, and on the W. and N.W. by the department of the Mayne and Loire; about 50 miles from N. to S., and 45 from E. to W. Its capital is Tours. It contains 325 ſquare leagues, and 278,758 inhabitants. It is divided into three diſtricts, *viz.* Tours, including 128,635 inhabitants; Loches, 57,094; and Chinon, 93,029. Its cantons are 24, and communes 311. Its annual contributions amount to 2,868,779 francs, and its expences to 246,653 francs. This department, on account of its fertility, has been ſtyled the garden of France. The vallies and eminences near the borders of the large rivers are fertile, but at ſome diſtance are heaths and uncultivated tracts. The diſtrict lying between the Loire and the Cher is of a light and ſandy, but productive ſoil. The peninſula formed by the Indre, the Loire, and the Vienne, is noted for its fertility. A tract, called Brenne, is moiſt, but tolerably fruitful. The principal products are rye, barley, millet, wine, fruits, and paſtures. It has mines of iron, and mineral ſprings.

INDU, a name of the moon among Hindoo mythologiſts. This luminary is more commonly called Chandra, or Soma. (See Soma.) It has been ſurmiſed that the name India and Hindoo, words unknown in the ancient language of the country, may have been derived from Indu; but ſir William Jones and Mr. Wilkins diſcountenance ſuch an etymology. See Moor's Hindoo Infanticide, p. 171.

INDUCEMENT, in *Law*, is what is alleged as a motive or incitement to a thing; and it is uſed ſpecially in ſeveral caſes: *viz.* there is inducement to actions, to a traverſe in pleading, a fact or offence committed, &c. Inducements to actions need not have ſo much certainty as in other caſes: a general *indebitatus* is not ſufficient, where it is the ground of the action; but where it is only the inducement to the action, as in conſideration of forbearing a debt until ſuch a day; (for that the parties are agreed upon the debt) this being but a collateral promiſe, is good without ſhewing how due.

INDUCIARUM Petitio. See Petitio, and Emparlance.

INDUCTION, in *Logic* and *Rhetoric*, a conſequence drawn from ſeveral propoſitions, or principles, firſt laid down.

Thus the concluſion of a ſyllogiſm, is an induction made from the premiſes. See Syllogism.

Induction is alſo uſed for a kind of ſyllogiſm itſelf; being a medium between an enthymeme and a gradation, in regard it wants a propoſition (which, however, is underſtood,) as in the enthymeme; and abounds in aſſumptions (which yet are collateral, or of the ſame degree), which is the caſe in a gradation.

For inſtance; every terreſtrial animal lives, every aerial animal lives, every aquatic animal lives, and every reptile animal alſo lives; therefore every animal lives.

Here, it may be obſerved, are various aſſumptions, from the more general ſpecies of the animal kind collected into one; which this propoſition is ſuppoſed to precede; *e. gr.* that every animal is either terreſtrial, aerial, aquatic, or reptile.

Suidas reckons three kinds of induction: that juſt mentioned, which concludes or infers ſome general propoſition from an enumeration of all the particulars of a kind, he calls the *dialectic* induction.

The ſecond proceeds by interrogation, and concludes probably, or with a veriſimilitude; this is what the Greeks called ϖαραγογη, and was that which Socrates ordinarily made uſe of, as Cicero, in his Topics, and Quintilian have obſerved: and, therefore, called the *Socratic* induction. This, however, is a captious way of reaſoning: for while the reſpondent is not aware of what is deſigned to be inferred, he is eaſily induced to make thoſe conceſſions, which otherwiſe he would not. Beſides, it is not ſo well ſuited to continued as to interlocutory diſcourſes.

The third kind of induction is properly *rhetorical*; being a concluſion drawn from ſome example, or authority.

This is a very imperfect induction, all its force lying in a propoſition which is concealed, and which will hardly bear being expreſſed. Thus, he that ſays, Codrus died bravely for his country, therefore I muſt die bravely for my country; proves nothing, unleſs this propoſition be carried in mind, that I muſt do the ſame with Codrus. Again, Archimedes, and the other mathematicians, ſay, the ſun is much bigger than the earth; therefore, it muſt be owned, the ſun is much bigger than the earth. Where this propoſition is underſtood, *viz.* whatever Archimedes, and the other mathematicians, ſay, is true.

Induction is one of the four forms of reaſoning uſed by orators in confirmation; the other three are ſyllogiſm, enthymeme, and example, which laſt coincides with the third ſpecies of induction above enumerated.

Induction, in the *Engliſh Laws*, is uſually taken for the giving poſſeſſion to an incumbent of his church, by leading him into it, and delivering to him the keys, by the commiſſary, or biſhop's deputy, and by his ringing one of the bells.

When a clerk is inſtituted into a benefice, he is to exhibit his mandate from the biſhop to the archdeacon, or other perſon to whom it is directed, and hath a right thereby to be inducted into his living; and if he be refuſed induction, he hath a remedy both in the eccleſiaſtical court, and alſo an action of the caſe in common law, againſt the archdeacon. If the inductor, or perſon to be inducted, be kept out of the church, or houſe, by laymen, the writ *de vi laica* lies for the clerk, which is directed out of the chancery to the ſheriff of the county, to remove the force, &c. If another clergyman, preſented by the ſame patron, keep poſſeſſion, a ſpoliation is grantable out of the ſpiritual court, whereby the tithes, &c. ſhall be ſequeſtered, till the right be determined.

The archdeacon rarely inducts a clerk in perſon, but uſually iſſues out a warrant to the clerks and lettered perſons within the archdeaconry, impowering any of them to do it in his ſtead.

An induction made by the patron of the church is void; but biſhops and archdeacons may induct a clerk to the benefices of which they are patrons, by preſcription. No induction is neceſſary to a donative, where the patron, by donation in writing, puts the clerk in poſſeſſion without preſentation. 11 Hen. IV. cap. 7.

The uſual form and manner of induction is, for the inductor to take the clerk by the hand, and then to lay it on the key of the church, which muſt be then in the door, and to ſay, “ By virtue of this inſtrument, I induct you in the real, actual, and corporal poſſeſſion of the rectory or vicarage of ----, with all its fruits, profits, members, and appurtenances.”—This done, he opens the door, and puts the clerk in poſſeſſion of the church, and ſhuts the door upon him; who, after he hath tolled a bell (if there be any) to give the pariſhioners due notice and ſufficient certainty of their new miniſter, comes out, and deſires the inductor to indorſe a certificate of his induction on the archdeacon's warrant, and that all preſent will ſignify it under their hands. If the church-key cannot be had, it is ſufficient that the clerk lays hold of the ring of the door, the latch of the church, gate, &c. and, within two months after this, the clerk muſt read the thirty-nine articles, and all the ſervice of the day, both at morning and evening prayers, in the pariſh church of his benefice, and in the time of common prayer, and declare his aſſent and conſent: he muſt alſo then read the ordinary's certificate, in which is the declaration of his conformity, together with the ſame declaration, and of all this he muſt have two or three good witneſſes, who muſt ſign that they heard him do it, and be ready to atteſt it, *viva voce*, if required; and, within ſix months after induction, he muſt alſo take the oaths of allegiance, ſupremacy, and abjuration, at the quarter-ſeſſions, or in ſome one of the courts at Weſtminſter-hall.

Induction makes the parſon complete incumbent, and fixes the freehold in him. When a clerk is thus preſented, inſtituted, and inducted into a rectory, he is then, and not before, called in law, *perſona imperſonata*, or parſon imparſonee. 13 Eliz. c. 12. 13 and 14 C. II. c. 4. 1 Geo. ſtat. 2. c. 13. 9 Geo. II. c. 26. 23 Geo. II. c. 28.

INDULGENCE, in the *Romiſh Theology*, the remiſſion of a puniſhment due to a ſin, granted by the church, and ſuppoſed to ſave the ſinner from purgatory.

The Romaniſts found their indulgences on the infinite treaſure of the merits of Jeſus Chriſt, the Holy Virgin, and all the ſaints; which they ſuppoſe the church has a right of diſtributing by virtue of the communion of ſaints. See Supererogation.

Theſe indulgences were firſt invented in the eleventh century by popes Gregory VII. Victor, and Urban II. as a recompence for thoſe who went in perſon upon the wild enterprize of conquering the Holy Land. See Croisade

They were afterwards granted to thoſe who hired a ſoldier for that purpoſe, and in proceſs of time were beſtowed on ſuch as gave money for accompliſhing any pious works enjoined by the pope. In the beginning of the twelfth century, the biſhops, whenever they wanted a ſupply of money for their private pleaſures, or the exigencies of the church, recurred to the ſcandalous traffic of indulgences; and when the Roman pontiffs ſaw that immenſe treaſures were thus accumulated by the inferior rulers of the church, they thought proper to limit the powers of the biſhops in remitting the penalties impoſed upon tranſgreſſors, and aſſumed it, almoſt entirely, as a profitable traffic to themſelves. They began with granting a plenary remiſſion of all the temporal pains and penalties which the church hath annexed to certain tranſgreſſions; and then proceeded to aboliſh even the puniſhments which are reſerved in a future ſtate for the workers of iniquity.

The Roman jubilee, firſt inſtituted by Boniface VIII. A.D. 1300, carries with it a plenary, or full indulgence, for all the crimes committed therein.

The pope alſo grants bulls of plenary indulgence to ſeveral churches, monaſteries, and even to private perſons; and it is a frequent thing to have general indulgences for the time of the principal feaſts of a year. Their caſuiſts ſay that a plenary indulgence does not always prove effectual, for want of complying with the conditions whereon it was granted.

For the extirpation of heretics, it has been a common practice with the popes to grant indulgences. Thus Clement XII. “ That we may ſtir up and encourage the faithful to extirpate this ungracious crew of forlorn wretches, (the Cevenois, when in arms againſt Lewis XIV.) we fully grant and indulge the full remiſſion of all ſins, whatever they may be (relying upon that power of binding and looſing, which our Lord conferred upon his chief apoſtle), to all thoſe that ſhall liſt themſelves in this ſacred militia, if they ſhall happen to fall in battle.” See Absolution.

Julius II. had beſtowed indulgences on all who contributed towards building the church of St. Peter at Rome, and pope Leo X. in order to carry on this magnificent ſtructure, publiſhed indulgences, and a plenary remiſſion on the ſame pretences. Finding the project take, he granted the right of promulgating theſe indulgences in Germany, together with a ſhare in the profits ariſing from the ſale of them, to Albert, elector of Mentz, and archbiſhop of Magdeburg, who employed Tetzel, a Dominican friar, as his chief agent for retailing them; and he farmed out thoſe of other countries to the higheſt bidders, who, to make the beſt of their bargains, procured the ableſt of their preachers to extol the value of the ware: “ Happy times for ſinners,” ſays a modern writer, “ their crimes were rated, and the remiſſion of them ſet up by auction. The apoſtolic chamber taxed ſins at a pretty reaſonable rate; it coſt but ninety livres and a few ducats, for crimes which people on this ſide the Alps puniſhed with death.”

Theſe are ſpecified in a book of rates called the Tax-Book of the Holy Apoſtolic Chancery, firſt printed at Rome in the year 1514, and aſcribed by ſome to pope Innocent VIII. From a correct edition of this book, printed by L. Banck, profeſſor at Norkopin, in Gothland, in 1651, it appears that the price of abſolution for fornication, attended with the moſt heinous circumſtances, was ſix groſſi or groats; for a layman's murdering a layman, five groats; for laying violent hands on a prieſt, without ſhedding blood, nine groats; for committing inceſt, five groats; for a prieſt's keeping a concubine, ſeven groats; for forging the pope's hand-writing, ſeventeen or eighteen groats. See the Taxa S. Cancellariæ Apoſtolicæ, a L. Banck. Franequeræ, 1651, p. 126, &c. It was this great abuſe of indulgences, that contributed not a little to the firſt reformation of religion in Germany; wherein Martin Luther began firſt to declaim againſt the preachers of indulgences, and afterwards againſt indulgences themſelves: but ſince that time, the popes have been more ſparing in the exerciſe of this power; however, they afterwards carried on a great trade with them in the Indies, where they were purchaſed at two reals a-piece, and ſometimes more. See Reformation.

Indulgence, or *Indulto*, ſignifies alſo a ſpecial favour, or privilege, conferred either on a community, or a particular perſon, by the pope's bulls; in virtue whereof the party is licenſed to do or to obtain ſomething contrary to the intention and diſpoſition of the common laws.

There are two kinds of indultos: the one *active*, which conſiſts in a power of nominating and preſenting freely, and without reſerve, to benefices that are otherwiſe limited, and reſtrained by the laws of the apoſtolical chancery; ſuch are thoſe ordinarily granted to ſecular princes, cardinals, biſhops, &c.

Paſſive indultos conſiſt in a power of receiving benefices, and expectative graces; of which kind are thoſe of a parliament, of graduates, mandataries.

The indulto of kings is the power given them of preſenting to conſiſtorial benefices, either by treaty, by favour, or ſpecial privilege.

The indulto of cardinals is a licence for holding regular as well as ſecular benefices, and for diſpoſing of benefices *in commendam*, or continuing them, &c.

Indulto of parliament is a right of privilege formerly granted to the chancellor, preſidents, counſellors, and other officers in the parliaments of France, to obtain a benefice of the collator, upon the king's nomination directed to him. This was a kind of advowſon, or patronage, belonging to the French king; the indulto being a mandate, or grace, by which he was permitted to name to any collator he pleaſed a counſellor, or other officer of parliament, on whom the collator ſhould be obliged to beſtow a benefice: ſo that the right of the indulto reſided radically in the king, the officers being only the objects thereof.

INDULPHUS, in *Biography*, the ſeventy-ſeventh king of Scotland, began his reign in the year 959. The early years of his reign were peaceable and proſperous, but afterwards his kingdom was invaded ſeveral times by the Danes, who were enraged againſt him for making an alliance with the Engliſh. Their firſt deſcent was upon Eaſt Lothian, whence they were ſoon expelled, but croſſed over to Fife. Here they were defeated, and driven out, and ſo well had Indulphus taken care to guard the coaſts, that they could find no other opportunity of invading the country; till, having thrown the Scots off their guard, they made good their landing in Banffſhire. Here Indulphus attacked them in their camp, and drove them towards their ſhips, but was killed in an ambuſcade, into which he fell during the purſuit.

INDULTO, in *Commerce*, denotes a duty, tax, or cuſtom paid to the king of Spain for all ſuch commodities as are imported from the Weſt Indies in the galleons.

INDURATING, a term applied to ſuch things as give a harder or firmer conſiſtence to others, either by the greater ſolidity of their particles, or by diſſipating the thinner parts of any matter, ſo as to leave the remainder harder.

INDURATION *of* STRATA, in *Geology*, denotes the change which all the maſſes of the earth evidently have undergone ſince they were depoſited in their preſent ſituation in a fluid or plaſtic ſtate; under the article HARDENING *of Strata*, we have noticed ſome of the facts and theories on this ſubject, to which we beg to refer.

INDUS, or SINDÉ, or, according to the proper Sanſcrit name *Sundhoo*, under which name it was not unknown to the Romans (*Indus incolis Sindus appellatur*, Pliny, l. vi.) a celebrated river of Aſia, which is formed of about 10 principal ſtreams, that deſcend from the mountains of Perſia, Tartary, and Hindooſtan, on the N.E. and N.W.; all which ſtreams, uniting near Moultan in Hindooſtan, form this famous river. The Ayin Acbaree ſays, the Sindé, according to ſome, riſes between Caſhmere and Caſhgar, whilſt others place its ſource in Khatai, meaning probably Koten, the Chatæ of Ptolemy, and not China. It is clear, however, that the people of Hindooſtan conſider the north-eaſtern branch as the true Sindé, though the ancients ſeemed to have reckoned otherwiſe; for Pliny ſays "in jugo Caucaſi montis, quod vocatur Paropamiſus, adverſus Solis ortum effuſus." The emperor Baber, indeed, applies the name of Sindé to one of its weſtern branches, that ſprings near Bamian, but he appears to differ in this particular from the reſt of his countrymen; for the name of Nilab, which was applied to the river that ran by the ſcite of Attock (long before that city was founded), was applied alſo to the ſame river, in its courſe through Little Thibet; and Nilab is ſynonymous with Sindé. (See NILAB.) The Indus, under the name of Nilab, paſſes through the country of Little Thibet; and its head muſt be on the weſt of the great ridge of mountains called by the ancients Imaus, becauſe on the eaſt of it, the rivers all run in a direction oppoſite to that of the Indus. About 20 miles above Attock, the periodical rains, which fell on the northern mountains, having conſiderably ſwelled the river, its breadth was about $\frac{3}{4}$ of a mile; its courſe rapid and turbulent, and its water extremely cold, with a great quantity of black ſand ſuſpended in it. At Attock the Indus is joined by the Cabul, and very conſiderably increaſed by it, ſo that from Attock downwards to Moultan, or to the conflux of the Panjab waters, where it has obtained the name of Attock, it is no longer fordable; below that point it is called Soor, or Shoor, until it divides itſelf into a number of branches near Tatta, where the principal branch takes the name of Mekran. This river, however, when ſpoken of generally, is called Sindé; although particular parts of it are known by different names. The Indus, and its branches, admit of an uninterrupted navigation from Tatta, the capital of Sindy, to Moultan and Lahore, for veſſels of near 200 tons. About 170 miles from the ſea, by the courſe of the river, the Indus divides into two branches, of which the weſternmoſt is by much the largeſt. This branch, after a courſe of about 50 miles to the S.W., divides into two more; the ſmalleſt of which runs in a W.S.W. courſe, to Larry-Bunder and Dacraway; and the largeſt, taking the name of Ritchel river, runs in a more ſouthwardly courſe to the town or village of Ritchel, on the ſea-coaſt. The other principal branch is that which bounds the eaſtern ſide of the Superior Delta; ſeparating, as we have ſaid, about 170 miles from the ſea. It is ſmaller than the Ritchel river, but larger than that of Larry-Bunder, and according to circumſtances and report, it opens into the mouth of the gulf of Cutch, nearly oppoſite to Jigat point; its courſe being ſomewhat to the eaſtward of ſouth. Major Rennell infers from various circumſtances, that the Delta of the Indus (ſee DELTA) is about 150 Britiſh miles in length along the ſea-coaſt, and about 115 in depth, from the place of ſeparation of the ſuperior branches of the river, to the moſt prominent point of the ſea-coaſt. The lower part of this Delta is interſected by rivers and creeks in almoſt every direction, like the DELTA *of the Ganges*, but without trees; the dry parts being covered with bruſhwood, and the remainder, being by much the greateſt part, being noiſome ſwamps, or muddy lakes. The upper part of the Delta is well cultivated, and yields abundance of rice. This Delta is ſet apart for the breeding of camels, anſwering this purpoſe by means of the tender parts of its bruſhwood, which ſerves them for fodder. The breadth of the Ritchel branch is eſtimated at one mile, juſt above the tide; and at Tatta, at only half a mile. It is certain that the Indus is very conſiderably leſs than the Ganges. The velocity of its current is eſtimated at four miles per hour in the dry ſeaſon; but this is ſuppoſed by Rennell to be over-rated. The courſe of the Indus river is ſtated by major Rennell at (probably) $6\frac{3}{4}$, that of the Thames being 1. This ingenious geographer mentions the moveable towns or villages that are ſituated on the banks of the river, noticed by Nearchus and the Ayin Acbaree; ſome of which are the habitations of fiſhermen, and others of graziers; which are continually changing their poſitions like a camp. Few rivers abound more with fiſh than the Indus does; and among theſe are ſome very delicious ſorts. The mouths of the

Indus are comprehended between N. lat. 23° 20′ and 24° 40′.

INDUSTRY, *Fruits of.* See FRUITS.

INEADA, in *Geography*, a town of European Turkey, in Romania; 56 miles E.N.E. of Adrianople.

INEQUALITY *of Natural Days.* See EQUATION.

INEQUALITY, *Optical.* See OPTICAL.

INERT *Vegetable Matter*, in *Agriculture*, is a term lately given to that ſort of vegetable matter which, by long and frequent expoſure, has been ſo ſaturated and combined with the oxygen or pure air of the atmoſphere, as to be rendered in a great degree inſoluble. The ſurface of peat moſſes, and the mould of ſuch ſoils as have been much expoſed to the action of pure air, by fallowing, are ſuppoſed to be rendered inert in this way by the author of the "Connection of Chemiſtry with Agriculture." See PEAT.

INERTIÆ VIS. See VIS *Inertiæ.*

INESCUTCHEON, in *Heraldry*, a ſmall eſcutcheon borne in a larger one, as part of ſome other coat. See ESCUTCHEON.

Guillim confines the name to an eſcutcheon borne ſingle in the feſs point or centre.

This is alſo ſometimes called an *eſcutcheon of pretence.*

He who marries an heireſs, bears her coat of arms on an *ineſcutcheon*, or *eſcutcheon of pretence*, in the middle of his own coat.

Modern heralds apply the name ineſcutcheon to thoſe ſmall eſcutcheons, ſeveral of which are borne in a large one.

INESERRHA, in *Geography*, a town of Africa, in Sennaar; 10 miles E. of Gieſſien.

IN ESSE is applied to things which are actually exiſting.

Authors make a difference between the thing *in eſſe*, and a thing *in poſſe*. A thing that is not, but may be, they ſay, is *in poſſe*, or *potentia*; but a thing apparent and viſible, they ſay, is *in eſſe*, that is, it has a real being *eo inſtanti*; whereas the other is caſual, and at beſt but a poſſibility.

INEVERAM, in *Geography*, a town of Hindooſtan, in the circar of Rajamundry; 32 miles S.E. of Rajamundry.

INFALISTATIO, an ancient puniſhment of felons, by throwing them among the rocks and ſands, cuſtomarily uſed in port-towns. It is the opinion of ſome writers, that *infaliſtatus* did imply ſome capital puniſhments, by expoſing the malefactor upon the ſands till the next tide carried him away; of which cuſtom, it is ſaid, there is an old tradition. However, the penalty ſeems to take its name from the Norman *faleſe*, or *faleſia*, which ſignified not the ſands, but the rocks and cliffs adjoining, or impending on the ſea-ſhore. "Commiſit feloniam ob quam fuit ſuſpenſus, utlagatus, vel alio modo morti damnatus, &c. vel apud Dover infaliſtatus, apud Southampton ſubmerſus, &c."

INFALLIBLE, from *in*, taken privatively, and *fallo*, I *deceive*, that which cannot deceive or be deceived.

Upon this term ſtands one of the principal heads of controverſy between the Reformed and the Catholics; the latter of whom maintain, that the church, aſſembled in general council, is infallible; which the former deny.

The Jeſuits, in their diſputes with the Janſeniſts, have expreſsly aſſerted that Jeſus Chriſt hath given to all popes whenever they ſhall ſpeak *è cathedra*, the ſame infallibility which he had, both in matters of right and fact.

The principal reaſons alleged for the infallibility, are drawn from the promiſes of Chriſt, from the obſcurity of the ſcriptures, the inſufficiency of private judgment, and the neceſſity there is of ſome infallible judge for the deciſion of controverſies.

The infallibility of the pope is a doctrine of a late ſtanding, and has not been entirely acquieſced in, even in their own communion, and altogether rejected by the Gallican church. See POPERY.

INFAMOUS, derived from *in*, and *fama*, *fame*, *report*, in the ordinary uſe of the word, ſignifies ſomething notoriouſly contrary to virtue, or honour.

Aulus Gellius uſes the word *infames materias*, for what we ordinarily call *paradoxes*, *i. e.* diſcourſes remote from the common opinion; propoſitions that appear oppoſite to truth, &c. as the elogy of Therſites, the praiſe of a quartan ague, &c.

INFAMOUS, in *Law*, denotes a perſon or thing, which is of no repute, or eſteem, in the world.

There are two kinds of infamy: ſome perſons being infamous as having been noted by the laws, or ſtigmatized by public judgment.

Infamy, which extends to forgery, perjury, groſs cheats, &c. diſables a man to be a witneſs or juror: but a pardon of crimes reſtores a perſon's credit to make him a good evidence. Judgment of the pillory makes infamy by the common law, but by the civil and canon law, if the cauſe for which the perſon was convicted was not infamous, it infers no infamy.

Others are held infamous, by the exerciſe of ſome ſcandalous profeſſion; as a catchpole, a merry-andrew, a hangman, an informer, &c.

Heretofore there were crowns of infamy given, by way of puniſhment, to criminals: they were made of wool.

INFANCY. See INFANT.

INFANT, in a *Law ſenſe*, a perſon under the age of one-and-twenty years, whoſe acts are in many caſes either void or voidable. (See AGE.) All gifts, grants, &c. of an infant, which do not take effect by delivery of his hand, are void; and if made to take effect by delivery of his own hand, are voidable by himſelf and his heirs; and thoſe who ſhall have his eſtate.

Although an infant, under 21, can make no deed which is not afterwards voidable; yet in ſome caſes he may bind himſelf apprentice by deed indented, or indentures for ſeven years (ſtat. 5 Eliz. c. 4. 43 Eliz. c. 2. Cro. Car. 179); and he may by deed or will appoint a guardian to his children, if he has any. Stat. 12 Car. II. c. 24.

By the cuſtom of London, an infant, unmarried, and above the age of fourteen, may bind himſelf apprentice to a freeman of London, by indenture, with proper covenants, which ſhall be binding.

An infant may bind himſelf to pay for neceſſaries, as meat, drink, apparel, phyſic, and learning, but not by bond with penalty; though a bill for neceſſaries, without a penalty for the very ſum due, it is ſaid, will bind him. Infants are not obliged to pay for clothes, unleſs it be averred for their own wearing: and that they were convenient and neceſſary for them to wear according to their degree and eſtate. An infant may buy, but cannot borrow money to buy neceſſaries; for the law will not truſt him with neceſſaries, but at the peril of the lender, who muſt lay it out for him in neceſſaries, or ſee it thus laid out.

An infant has been adjudged of age the day before his birth-day; for the law will not make a fraction of a day; therefore where a perſon was born the third of September, and the ſecond of September, twenty-one years after, he made his will, it was held good, and that he was then of age to deviſe his lands. And it is ſaid ſuch will ſhall take effect, though the deviſor dies by ſix at night of that day.

An infant eight years of age, or upwards, may commit homicide, and be hanged for it, if it appear, by any other act, that he had knowledge of good and evil; for here *malitia ſupplebit ætatem:* yet Coke on Littleton, sect. 405, ſays, "An infant ſhall not be puniſhed till the age of fourteen;" which, according to him, is the age of diſcretion.

But this depends on the degree of judgment which he poſſeſſes. If an infant be *infra annos infantiæ, viz.* ſeven years old, he cannot be guilty of felony, whatever circumſtances proving diſcretion may appear. See Age, in *Law*, Executor, Guardian, &c. See alſo Rape.

An infant *en ventre ſa mere*, or in the mother's womb, is capable of having a legacy, or a ſurrender of a copy-hold eſtate made to it. It may have a guardian aſſigned to it (ſtat. 12 Car. II. c. 24.); and is enabled to have an eſtate limited to his uſe, and to take afterwards by ſuch limitation, as if it were then actually born (ſtat. 10 & 11 W. III. c. 16.); and in this point the civil law agrees with our's. Though infants cannot alien their eſtates, yet infant truſtees or mortgagees are enabled to convey, under the direction of the court of chancery or exchequer, or other courts of equity, the eſtates they hold in truſt or mortgage, to ſuch perſon as the court ſhall appoint. By the cuſtom of gavel-kind, an infant, at the age of fifteen, is reckoned at full age to ſell his lands; and by cuſtom, in ſome places, an infant ſeiſed of land in ſocage, may, at the ſame age, make a leaſe of years, that ſhall bind him after he comes of age.

An infant, who has an advowſon, may preſent to the benefice when it becomes void. (Co. Litt. 172.) An infant is capable of inheriting, and may alſo purchaſe lands, but his purchaſe is incomplete; for, when he comes to age, he may either agree or diſagree to it, without alleging any reaſon; and ſo may his heirs after him, if he dies without having completed his agreement. (Co. Litt. 2.) And in caſe any infant bargain and ſell his land by deed, indented and inrolled, yet he may plead non-age.

If an infant grants leaſes for a term of years, he may, at his full age, either confirm the leaſe, or bring treſpaſs againſt the leſſee for the occupation. Alſo a leaſe granted to an infant, may be avoided by waiving the land before the rent-day expreſſed therein. However, infants are bound in all acts of neceſſity; as preſentations to benefices, admittances and grants of copy-hold eſtates, aſſenting to legacies, and conditions annexed to lands, whether the eſtate comes by grant or deſcent. If an infant be the defendant in an action, the plaintiff ſhall have ſix years for commencing his action, after the defendant comes of age; and an infant, who is a plaintiff, has alſo ſix years after he comes of age, to ſue by the ſtatute of limitation.

Infants, *Diſeaſes of*, in *Medicine*. When the extreme delicacy and tenderneſs of every part of the ſtructure of the infant frame is conſidered, as well as the extraordinary revolution, which it ſuddenly undergoes, in paſſing from its vegetating ſtate, as it were, in the uterus, to that of a breathing animal, it muſt be obvious that a thouſand circumſtances, which make no impreſſion on the adult frame, will powerfully influence that of the infant; and that the utmoſt care will be required to ſhield it from numerous cauſes of diſeaſe, from the moment of its birth. To the neglect of theſe circumſtances, or to their inability of attending to them, the great mortality that occurs among the children of the poor, in large cities, is perhaps chiefly to be aſcribed. But this was formerly much augmented, among all ranks, by the abſurd and unnatural interference of art, which was apparently dictated by a notion that the inſtincts and intimations of nature were to be oppoſed, as of the moſt baneful tendency. Fortunately the more rational ſyſtem of following theſe intimations, as the beſt guides to health, has generally ſuperſeded that abuſe; and it will only be requiſite for us here to ſpeak of ſome of the accidents attendant on birth, of the more frequent connate imperfections of ſtructure, and of the diſeaſes peculiarly belonging to the period of infancy and childhood.

Recovery of *ſtill-born or weakly infants.* Dr. Hamilton obſerves, that the occaſional recovery of ſtill-born children, under circumſtances where experience alone could have encouraged any hopes, ought to teach practitioners the importance of employing, with patience and attention, the means conducive to that purpoſe. If there is no pulſation in the umbilical cord, the infant ſhould be inſtantly ſeparated from the mother, the cord being tied by a ſlip knot, and the body immerſed in warm water. The lungs ſhould be then diſtended with air, by means of a bag of elaſtic gum, or a common ſyringe, (the pipe of which is to be inſerted into one noſtril, while the other and the mouth are carefully cloſed,) and again emptied by gentle preſſure on the breaſt. In this way an alternate diſtention and compreſſion of the lungs ſhould be continued for ſome time. Should the action of the heart be now perceived, the ſame means are to be continued, until the infant exhibit the uſual marks of beginning reſpiration, when the artificial diſtention of the lungs is to be only occaſionally repeated, and all preſſure on the breaſt is to be avoided. But if, notwithſtanding theſe means, the pulſation of the heart be not reſtored, the infant ſhould be taken out of the warm water, placed before the fire, carefully rubbed, and then wrapped in warm flannel. A glyſter, conſiſting of a table-ſpoonful of ſpirits, and two or three table-ſpoonfuls of warm water ſhould then be adminiſtered, and the temples, noſtrils, and teguments of the face round the mouth, ſhould be gently touched with a feather, dipped in vitriolic æther, or ſpirits of hartſhorn. But, ſecondly, if the pulſation in the cord of a ſtill-born child is diſtinct and ſoft, and the infant has the natural appearance, ſo long as the placenta remains attached to the uterus, the child ought not to be ſeparated from the mother. The body ſhould be carefully wrapped in warm flannel, the noſtrils and fauces ſhould be touched with a feather dipped in vitriolic æther, and a little ſpirits rubbed on the breaſt. If the after-birth become detached, (which is known by the lengthening of the cord,) the child muſt be immediately ſeparated, and the above means employed. Should the proceſs of breathing commence after theſe means have been uſed for a few minutes, nothing elſe is to be done than keeping the infant warm, with its face freely expoſed to the air. But ſhould this not take place, the lungs are to be diſtended and again compreſſed, as in the firſt caſe. See Prof. Hamilton's Hints on the Diſeaſes of Infants, &c.

Although alive when born, the infant, in ſome inſtances, lives only a ſhort time. If the lips be pale, and the pulſation in the heart very feeble or ſlow, it may be ſuſpected that this originates from ſome cauſe which is not cognizable to the ſenſes. On the ſuppoſition that it ariſes from a deficiency of vitality, ſtimulants have been applied to the ſurface, as a little brandy, or ſpirits of hartſhorn, rubbed on the ribs and ſpine, &c.: and ſuch means have occaſionally proved efficacious, though in the majority of caſes they fail. When the extremities are of a purple or blueiſh colour, and the breathing is impeded or unnatural, it is generally found that there is a defect in the heart or lungs, which is beyond the power of any remedy.

§ 1. *Connate Imperfections.*—Children are not always born in a ſtate of perfection in reſpect to the ſtructure of their bodies; for ſometimes they have deficient, ſuperfluous, or miſplaced parts, natural paſſages cloſed, and various marks on the ſurface. Many of theſe imperfections admit of no remedy; while others may be eaſily rectified. The following are thoſe which are moſt frequently met with.

Fiſſures in the lips not only conſtitute a remarkable deformity, but commonly prevent the child from ſucking. They appear under various forms. Sometimes the fiſſure exiſts only in one lip, generally the upper one, and is occaſioned merely by a diviſion of the ſoft parts: in other caſes, there is a conſiderable loſs of ſubſtance between the divided parts: in ſome inſtances, again, there are two fiſſures in one lip, or both lips are affected: and in others, the fiſſure is not confined to the lips, but extends along the roof of the mouth. All theſe different ſpecies of the ſame deformity receive the general name of *hare-lip;* which ſee.

The *tongue* is naturally bound down to the lower part of the mouth by a membranous cord, to prevent it from too great a degree of motion. Sometimes, however, the cord fixes it ſo much, that the infant cannot ſuck, in which caſe it is commonly ſaid to be *tongue-tied.* Women very often imagine that their children have this defect, when it does not really exiſt: and perhaps one inſtance of it does not occur in ſeveral hundreds of thoſe that are born. The diſeaſe may be always diſcovered by putting a finger gently into the child's mouth; for if he be able to graſp it, as he would do the nipple in ſucking, or if the tip of the tongue appear diſengaged, the membrane does not require to be cut. The operation of dividing the *frænum,* trifling as it may appear, requires ſome caution, in order to avoid wounding the ſublingual veins, and cutting too deep; for in the firſt caſe, a fatal hæmorrhage may enſue; and in the ſecond, if the tongue is looſened too much, the tip may be turned back, and cloſe up the throat; an accident that muſt ſoon occaſion death. It may be diſcovered by the threatening ſuffocation or convulſions, and by the introduction of the finger into the mouth, by which alſo the tongue may be pulled back, and the conſequences avoided. This, however, is a very rare accident: it has been abſurdly called "ſwallowing the point of the tongue." See Underwood on the Diſeaſes of Children, vol. ii. p. 17. 5th edit.

The *natural paſſages,* eſpecially the *anus, vagina,* and *urethra,* are ſometimes *imperforate,* preventing altogether, or in great part, the uſual excretions. In ſome caſes, a collection of mucus alone proves the obſtacle; but in others, membranous ſubſtances cloſe up the paſſages, in which laſt inſtances, an operation will be requiſite to open the parts, which muſt be performed by a ſkilful ſurgeon. In reſpect to the vagina, Dr. Underwood obſerves that he never found the external parts totally imperforate, there being always a ſmall opening at the *meatus urinarius:* but the aperture to the vagina itſelf ſometimes requires to be opened, either by the point of a lancet, or by the fingers only, which is generally eaſily effected, there being always a *raphè,* or line, where the natural opening ſhould be. The anus is ſometimes cloſed only by a thin membrane, ſo that the day after birth the meconium may be diſtinctly felt, and in a manner ſeen ſhining through it. A ſlight puncture with a lancet, and paſſing a bougie or the point of a finger into the bowel for two or three days afterwards, is ſufficient to remove this impediment. But more commonly the imperforate anus is a melancholy caſe, allowing of no effectual remedy, as the gut often terminates in a cul-de-ſac: ſo high as not to be reached. The imperforate penis is not quite ſo common a caſe; but is not unfrequently ſuſpected, when the aperture of the paſſage is merely ſtopped up by a little mucus. Under ſuch circumſtances, waſhing the part with warm milk and water, or at moſt a little aſſiſtance with a ſmall probe, or any ſuch blunt-pointed inſtrument, will be ſufficient to open the paſſage. When the urethra is perfectly open nearly to the extremity, as often happens, it is neceſſary only to make a ſmall aperture with a lancet, or a fine trocar, and to keep the part open by the occaſional introduction of a ſlender bougie.

Tumours about the back-bone of infants are always dangerous. If they be ſoft, partly tranſparent, and obviouſly connected with the ſpine, conſtituting the diſeaſe called *ſpina bifida,* or *hydrorachitis,* they moſt generally prove fatal ultimately; although in ſome inſtances, the progreſs to that event has been very ſlow, the child having lived to the thirteenth year. Fortunately, however, it more commonly terminates within a few months after birth: where it is protracted, the individual is in a miſerable ſtate, being paralytic in his lower limbs, &c.

Retention of the Meconium.—The meconium is that black, viſcid matter, which every infant diſcharges from the inteſtines for the firſt two or three days after birth; and many complaints have been aſcribed to the undue retention of it, and conſequently a great variety of purgative medicines have been recommended to be given, almoſt as ſoon as the child is born, with a view to expel it. But experience has taught that the natural evacuant of this matter is the firſt milk of the mother, which is ſlightly laxative in its properties: the infant, therefore, ſhould be put to the breaſt as ſoon after birth as the ſituation of the mother will allow. The pernicious practice of giving infants purging medicines, Dr. Hamilton remarks, as ſoon as they are born, cannot be too much reprobated; for the retention of the meconium for ſome hours after birth certainly produces leſs inconvenience than is occaſioned by the acrimony of the ſubſtances which the child is often forced to ſwallow. The moſt ſimple artificial means, he adds, for removing this matter, are Liſbon ſugar diſſolved in water, or a ſolution of manna. Where theſe fail, a teaſpoonful of cold drawn caſtor oil is to be given.

Jaundice, or, as the nurſes term it, the *yellow gum,* is among the diſeaſes which take place within a few days after birth. It is preceded by drowſineſs, and diſinclination to ſuck, and is ſoon diſcovered by the univerſal yellowneſs of the ſkin. Sometimes the whites of the eyes appear yellow for a day or two before the other ſymptoms appear: the tinge of the ſkin is ſeldom deep, and the diſeaſe is more readily removable than the jaundice of adults; but caſes are occaſionally met with, where the colour of the ſkin is of a dark yellow, the infant moans conſtantly, and convulſions follow, which at laſt deſtroy life. In regard to the treatment of this diſeaſe, if the child ſeem to ſuffer no uneaſineſs, although its ſkin be quite yellow, and if his bowels be open, it will be unneceſſary to adminiſter any medicines. But if he be unable to ſuck, and have a diſpoſition to conſtant ſleep, active meaſures ſhould be adopted. Theſe conſiſt principally in evacuating the viſcid matter, which probably clogs up the biliary ducts. An emetic of ipecacuan, and briſk laxatives, as of rhubarb, or frequent doſes of a ſolution of manna, will then be found neceſſary, and their effects may be much promoted by the warm bath. When violent colic pains or convulſions accompany the yellow gum, there is reaſon to fear that the liver is diſeaſed, and little can be expected from any remedy.

The *thruſh,* ſore mouth, or *aphthæ,* is ſo common a diſeaſe in early infancy, that it has been imagined to be a ſalutary effort of nature to expel ſome hurtful matter from the ſyſtem, which might otherwiſe be productive of many complaints at a future period. This opinion, however, is merely a vulgar prejudice, founded neither on reaſon nor experience. *Aphthæ* appear to be connected with a deranged condition of the alimentary canal, and ſeem to ariſe moſt frequently from the too early or too liberal uſe of ſpoon-meat, or improper food : but other cauſes occaſionally produce it, ſuch as expoſure to cold, damp weather, &c. In the treatment of this complaint, Dr. Hamilton affirms, that the great object hould be to promote its natural progreſs, and to counteract he effects of the acrimony of the ſaliva. The early uſe of timulant applications, ſuch as gargles of port-wine and borax, force off the ſpots before they have undergone the natural changes, and by their irritation keep up the diſeaſe. But the proper objects may be obtained by putting frequently into the infant's mouth a tea-ſpoonful of a liquor, prepared by mixing with the white of an unboiled egg, three able-ſpoonfuls of cold water, and a little refined ſugar, by prohibiting all ſpoon-meat, and by frequently duſting he natural paſſages with prepared calamine or tutty powder. When the ſpots become yellow, the borax may be llowed. It is to be mixed with eight or ten times its weight of powdered ſugar or of honey, or it may be diſſolved in fig-tea in the ſame proportion. If the ſpots grow ivid, bark and port-wine ſhould be uſed as a gargle, while he infant is ſupported by means of ten or twelve parts of warm cow's milk, mixed with one part of ſherry wine. The ſame kind of nouriſhment is neceſſary in caſes, where, rom the extenſive incruſtation over the tongue and cheeks, he infant is incapable of ſucking, which often happens for day or two. See APHTHÆ.

§ 2. *Diſeaſes of the Skin.*—Two diſeaſes, of a febrile naure, connected with a morbid condition of the ſkin, have een deſcribed by writers on the diſorders of infancy, which merit attention. They are almoſt unknown, however, exept to the phyſicians of lying-in hoſpitals, as they have eldom occurred in the private houſes of individuals. The rſt of theſe is eryſipelatous inflammation of the ſkin, called y Dr. Underwood *eryſipelas infantile*, which ordinarily ccurs within a few days after birth, and ſometimes at a ter period. It ſeizes the moſt robuſt, as well as delicate, hildren ; making its attacks in a very ſudden manner, and roceeding rapidly in its courſe. It moſt commonly apears firſt on the toes or fingers, which look ſwelled and lue, as if from cold ; but in the more violent forms, it egins about the pubes, and extends upwards on the belly, nd down the thighs and legs ; or ſometimes it commences the neck, when it is equally dangerous. It appears, ineed, to be always moſt dangerous when it ſeizes or ſpreads the body, and moſt mild when confined to the extreities. Suppuration and gangrene are occaſionally the conequences ; but even where neither of theſe events takes place, may terminate fatally from effuſion into ſome of the caviies, or from the inflammation extending to the contents of the domen, glueing the parts together, and throwing out upon eir ſurface an exudation of coagulable lymph. On the hole, the treatment of this infantile *eryſipelas* has too freuently proved unſucceſsful. The uſe of ſaturnine lotions nd poultices, on the firſt appearance of the inflammation, emed to check its progreſs at firſt ; but it was ſoon found ſpread, and to terminate in a fatal ſuppuration or morfication. A more cordial plan of treatment has been tended with a ſomewhat greater degree of ſucceſs ; and e application of external ſtimulants, ſuch as linen comreſſes wrung out of camphorated ſpirit, has in ſome caſes ecked the inflammation. The bowels ſhould be kept open, and the free admiſſion of pure air enforced : indeed, it is probable that, in proportion to the effectual ventilation employed, the occurrence of the diſeaſe will be diminiſhed, and its violence, when it does appear, mitigated.

Another affection of the ſkin, accompanied by fever, and occurring under ſimilar circumſtances, has been called by Dr. Underwood, who was one of the firſt to deſcribe the diſeaſe, the *ſkin-bound diſeaſe*. This does not happen invariably, like the preceding complaint, within a ſhort time after birth ; for it has been known to attack infants above ſix months old. It is uſhered in with violent fever, with coldneſs of the limbs, oppreſſed breathing, and almoſt conſtant moaning. The ſkin is of a yellowiſh-white colour, reſembling ſoft wax in its appearance, and not only thickened and hardened, but evidently unyielding ; the cellular membrane is fixed in ſuch a manner that it will not ſlide over the ſubjacent muſcles, not even on the back of the hands, where it is uſually very looſe and pliable. This ſtricture often extends over the whole body ; but the ſkin is peculiarly rigid in the parts about the face, and on the extremities. The child is always cold, and whatever number of days it may ſurvive, has conſtantly the appearance of being in a dying ſtate. The ſtools are of a clayey colour and conſiſtence ; and the diſeaſe ſeems to be much connected with a diſorder of the chylopoietic organs, eſpecially of the liver. The free uſe of laxatives, together with the warm bath, and ſome cordial medicines, appears to have been occaſionally ſucceſsful ; but in general, where the progreſs of the diſeaſe has not been arreſted in the commencement, it has terminated fatally.

The moſt common affections of the ſkin, however, that occur in early infancy, are unaccompanied by fever, are productive of only ſlight inconvenience, without danger, and conſiſt principally of certain raſhes, or eruptions of papular or puſtular ſpots. The moſt common of theſe is a papular eruption, which appears under a variety of forms, and has been called the *gum*, or technically *ſtrophulus*. Dr. Willan has diſtributed thoſe varieties of appearance under five heads : the moſt frequent of which is the *red gum* (or *red gown*, as it was formerly denominated, probably becauſe the child's ſkin, thus variegated, ſomewhat reſembles a piece of red printed linen), the ſtrophulus *intertinctus*. The *papulæ*, or pimples, in this affection, riſe ſenſibly above the level of the cuticle, are of a vivid red colour, and commonly diſtinct from each other : their number and extent vary much in different caſes. They appear moſt conſtantly on the cheeks, fore-arm, and back of the hand, but are ſometimes diffuſed over the whole body. This eruption has not in general any tendency to become puſtular, but uſually terminates in ſcurf, or exfoliations of the cuticle. Its duration, however, is very uncertain : the papulæ and ſpots ſometimes remain for a length of time without any alteration ; ſometimes diſappear and come out again daily : but for the moſt part, one eruption of them ſucceeds another, at longer intervals, and with more regularity. The red gum occurs chiefly within the two firſt months of lactation : it is not always accompanied or preceded by any diſorder of the conſtitution, but appears occaſionally in the ſtrongeſt and moſt healthy children. In many inſtances, it is connected with a weak irritable ſtate of the alimentary canal, and conſequent indigeſtion. For if it be, by any means, ſuddenly repelled from the ſurface, diarrhœa, vomiting, ſpaſmodic affections of the bowels, and often general diſturbance of the conſtitution, ſucceed ; but as ſoon as it reappears, thoſe internal complaints are wholly ſuſpended. Dr. Armſtrong and others have particularly noticed this reciprocation, which makes the *red gum* at times a diſeaſe of ſome importance, though, in its uſual form, it is not thought to be in any reſpect dangerous. On their remarks a neceſſary caution is founded, not to expoſe infants to a ſtream of very cold air, nor to plunge them unſeaſonably in a cold bath; the moſt violent and even fatal ſymptoms having often been the conſequence of ſuch imprudent conduct. Little need be ſaid in regard to the treatment of the *red gum:* the common mild appearance of it, being conſiſtent with a healthy ſtate of all the functions of the body, requires no medicinal application. It is, however, adviſable to keep the ſkin clear from *ſordes*, and to promote equable perſpiration. This may be done beſt by daily ablutions with tepid water, which prove uſeful in moſt cutaneous diſorders, and will be found of conſiderable importance with reſpect to the general health of the infant.

The other varieties of *ſtrophulus*, mentioned by Dr. Willan, are two, the *S. albidus*, or *white gum*, which differs from the former merely in the appearance of its papulæ, which conſiſt of a number of minute, whitiſh ſpecks, a little elevated, and ſometimes, though not conſtantly, ſurrounded by a ſlight redneſs, occurring chiefly on the face, neck, and breaſt, and being more permanent than the papulæ of the *red gum*. 3. *S. confertus*, or *rank red gum*, ſometimes alſo called the *tooth-raſh*, which uſually takes place about the fourth or fifth month after birth, on the cheeks and ſides of the noſe, extending ſometimes to the forehead and arms, but rarely to the trunk of the body, and accompanying the ſtate of dentition; and in the ſeventh or eighth month aſſuming a ſomewhat different form, appearing in one or two large irregular patches, of a high red colour, on the arms, ſhoulder, or neck. 4. *S. volaticus*, which is characteriſed by ſmall, circular patches, or cluſters of papulæ, ariſing ſucceſſively on different parts of the body, continuing red, with a little heat or itching, for about four days, when they turn brown, and begin to exfoliate; the ſucceſſive patches, however, not ceaſing to appear in leſs than three or four weeks. And, 5. Strophulus *candidus*, in which the papulæ are larger than in any of the foregoing ſpecies, have no inflammation round their baſe, and a very ſmooth and ſhining ſurface, whence they appear to be of a lighter colour than the adjoining cuticle; they are diffuſed, at a conſiderable diſtance from each other, over the loins, ſhoulders, and upper part of the arms. This eruption affects infants about a year old, and moſt commonly ſucceeds ſome of the acute diſeaſes to which they are liable, ſuch as catarrhal fever, or inflammations of the bowels or lungs: the papulæ continue hard and elevated for about a week, and then gradually ſubſide and diſappear. See Willan on Cutan. Diſeaſes, Order 1. Genus 1.

The ſtrophulus *volaticus* being ſometimes connected with a diſorder of the ſtomach and bowels, it becomes requiſite to adminiſter a gentle emetic or ſome laxative medicines; after which the decoction of Peruvian bark will be found of advantage. No external application ſeems neceſſary. The ſtrophulus *confertus*, when the child is otherwiſe healthy, is generally aſcribed to a ſtate of indigeſtion, or ſome feveriſh complaint in the mother or nurſe: but the eruption is frequently ſeen when no ſuch cauſe for it is evident. It may with more probability be conſidered as one of the numerous ſymptoms of irritation, ariſing from the inflamed and painful ſtate of the gums in dentition; ſince it always occurs during that proceſs, and diſappears ſoon after the firſt teeth have cut through the gums. On this view the eruption requires no ſpecific conſideration in medical practice; it can only be alleviated by the general treatment proper for the ſtate of teething, to be mentioned preſently.

This ſpecies of *ſtrophulus* appears under other modifications, which have been miſtaken for meaſles. One very obſtinate and painful form of it is noticed by Dr. Willan, which takes place, though not often, on the lower extremities. The papulæ ſpread from the calves of the legs to the thighs, *nates*, loins, and round the body as high as the navel: being very numerous and cloſe together, they produce a continuous redneſs over all the parts above-mentioned. The cuticle preſently becomes ſhrivelled, cracks in various places, and finally ſeparates from the ſkin in large pieces. During this proceſs a new cuticle is formed, notwithſtanding which the complaint recurs in a ſhort time, and goes through the ſame courſe as before. In this manner, ſucceſſive eruptions take place during the courſe of three or four months; and perhaps do not ceaſe till the child is one year old, or ſomewhat more. Children neceſſarily ſuffer great uneaſineſs from the heat and irritation occaſioned by ſo extenſive an eruption; yet, while they are affected with it, they often remain free from any internal or febrile complaint.

This appearance, Dr. Willan remarks, ſhould be diſtinguiſhed from the *intertrigo* of infants, which exhibits an uniform red, ſmooth, ſhining ſurface, without papulæ; and which affects only the lower part of the *nates* and inſide of the thighs, being produced by the ſtimulus of the urine, &c., with which the child's clothes are almoſt conſtantly wetted. Under the head of *intertrigo*, however, we muſt include all thoſe varieties of *chafing* and *excoriation* which occur in thoſe parts where the ſkin is folded, or in contact, and therefore liable to conſiderable attrition. (See INTERTRIGO.) From the delicate ſtructure of the ſkin of infants, Dr. Hamilton obſerves, *excoriations* readily take place wherever one part of it is in conſtant contact with another, unleſs the moſt careful attention be paid to keep every part dry. The ears, neck, arm-pits, and groins are chiefly liable to be affected in this manner. When the excoriations are not allowed to continue for a conſiderable length of time, they ſeldom require any other treatment than being duſted, morning and evening, with prepared tutty, or calamine, or with common aſhes finely powdered, or a little hair-powder or ſtarch. But when a diſcharge of matter is the conſequence of neglected excoriations, a cure can only be obtained by much care and attention; for it is often very difficult to ſtop theſe runnings. Some practitioners have objected to ſuch attempts, on the falſe ſuppoſition that the diſcharge is a ſalutary outlet for an overload of the ſyſtem. Theſe opinions, admirably well calculated to favour the careleſsneſs of nurſes, are founded upon improper views of the operations of nature.

Many different remedies will be found beneficial in different caſes of excoriation; ſuch as waſhing the parts daily with brandy and water, lime-water, a weak ſolution of ſugar of lead, or of white vitriol, and dreſſing them with any mild ointment, as ſpermaceti ointment, Turner's cerate, or ointments containing the oxyd of zinc, or a ſmall portion of the ointment of nitrate of mercury. While theſe means are purſued, an open ſtate of the bowels is to be promoted, by the occaſional exhibition of any gentle laxative, as manna diſſolved in water, &c. The uſe of mild mercurials, as alteratives, ſuch as the hydrargyrus cum creta, &c. is likewiſe beneficial.

Some other ſlight eruptions, to which young children are liable, chiefly of the papular form, are mentioned by Dr. Underwood, and require no other treatment than an attention to the ſtate of the bowels, or the uſe of ſome teſtaceous powders. See his Treatiſe on Diſ. of Children, vol. i.

There is a very common eruption, ſays the writer juſt quoted, that calls for more attention, and to which medical writers have given the name of *cruſta lactea*, (or *milk-blotches*, as Dr. Hamilton tranſlates it,) "which has a very unpleaſant appearance, but is, notwithſtanding, equally innocent with the former, and even prevents other complaints. I think I never ſaw an infant," he continues, "much loaded with it, but it has always been healthy, and cut its teeth remarkably well: indeed it falls to the lot of the fineſt children, and ſuch as are well nouriſhed; whence ſome have imagined it owing only to the richneſs of the milk. And it is remarkable in this eruption, that howſoever thick and long-continued the ſcabs may be, the *cruſta lactea* never excoriates, nor leaves any ſcar on the parts." It is not attended with any fever, or obvious derangement of the ſyſtem. The cruſt appears firſt on the forehead, and often extends half way over the face in the form of large looſe ſcabs. It is ſometimes attended with ſevere itching. Practitioners in general affirm that medicines are not required, and are rather injurious than beneficial in this eruption; that mild laxatives, ſo as to keep the paſſage of the bowels free, may be employed, but that all active purgatives are to be avoided; and, laſtly, that where there is exceſſive itching, ſome weak cooling aſtringent lotion, of the acetate of lead, or ſulphate of zinc, ſhould be applied to the parts. Dr. Underwood denies that the *cruſta lactea* ever degenerates into ſcald-head, as ſome authors before him had mentioned. But Dr. Hamilton has pointed out a modification of *cruſta lactea*, which frequently takes place during teething, and is a moſt obſtinate and troubleſome complaint. "This," he ſays, "is characterized by a redneſs of the ſkin round the edge of the incruſtations; by an ichorous or clear-coloured exudation iſſuing from the ſurface of the ſcabs, which concretes, and which tends to carry the diſeaſe over every part of the face which it touches. There cannot be a doubt, indeed, that this form of *cruſta lactea* is contagious, and nothing leſs than a variety of the ſcald-head, or *tinea capitis*, the *Porrigo* of Dr. Willan's nomenclature, in which this ſpecies is called Porrigo *larvalis*. The cure of this modification of the diſeaſe requires conſtant ablution with milk and water, thin gruel, &c., to remove the acrid fluid which exudes, and the application of ſome drying ointment. Some alterative preparation of mercury is likewiſe uſeful internally, ſuch as the hydrargium creta, or the grey oxyd, followed by the vegetable and mineral tonics. See PORRIGO.

Dr. Hamilton has ſtated the following practical concluſions reſpecting the eruptions of children in general. They may all be divided into two claſſes, he obſerves, the *firſt* of which are temporary, or of ſhort duration; are commonly uſhered in with ſymptoms of general indiſpoſition, and are owing to ſome diſorder of the ſtomach or bowels, or to ſome interruption of the uſual excretions or ſecretions: the *ſecond* are of an indefinite duration; break out gradually without any derangement of the ordinary health; and are probably, in moſt inſtances, the effects of ſome diſeaſed condition of the lymphatic ſyſtem, though, ſometimes, they may be occaſioned by a local affection of the ſkin itſelf. The treatment requiſite in theſe two forms of eruption is thus ſtated. In the *firſt* claſs, where ſymptoms of indiſpoſition, ſuch as heat, reſtleſsneſs, ſickneſs, or oppreſſion, are followed by an eruption, a briſk doſe of calomel ſhould be firſt ordered, together with the warm bath, and afterwards occaſional purgatives, and a ſuitable regulation of the diet, are to be adviſed. But, in the *ſecond* claſs, where the appearance of the eruption is unaccompanied by fever or marks of indiſpoſition, ſome of the medicines called alteratives, and the daily uſe of warm bathing, particularly in ſea-water, ſhould be recommended. The medicines to which an alterative power is aſcribed, he continues, are preparations of mercury, of antimony, of ſulphur, and of neutral ſalts; and therefore calomel in very ſmall doſes, or antimonial wine, or the ſulphuret of antimony, or Harrowgate or Cheltenham waters, or ſome imitation of theſe, are the remedies to be chiefly depended upon. It is commonly neceſſary to order a protracted courſe of theſe medicines. In ſome caſes, other topical applications (beſides the warm bath) are neceſſary, to allay irritation, ariſing from exceſſive heat and itching of the ſkin. The moſt efficacious are lime-water mixed with oil, a ſolution of potaſs, and the acetite of ammonia much diluted. The metallic ſolutions are too powerful to be employed, except upon very particular occaſions. Iſſues have been often employed in thoſe caſes, but experience has proved that purging anſwers better. Very diſtreſſing effects have followed the application of a bliſter, where there was a tendency to chronic eruptions of the ſkin. Hamilton's Hints for the Treatment of the principal Diſeaſes of Infancy and Childhood, p. 130.

§ 3. *Dentition*.—It is generally admitted that the time of *teething* is an important period of the infant ſtate, during which a number of diſorders of a formidable character are liable to occur. Dr. Cadogan, indeed, and Dr. Armſtrong ſeem to have entertained a ſomewhat different opinion upon this ſubject, and have aſcribed the complaints, connected with the proceſs of dentition, to ſome other morbid condition of the habit, ſuch as too great fulneſs, or a corrupt ſtate of the fluids: but this appears to be a difference only in terms, and implies an admiſſion of the occurrence of the diſeaſes alluded to. (See Armſtrong on the Diſeaſes moſt incident to Children, &c. p. 61.) It is certain that the natural proceſs of dentition is productive of pain and indiſpoſition in by far the greater number of inſtances: ſome infants, indeed, ſuffer leſs than others, but few enjoy perfect health while teething. We ſhall firſt deſcribe the progreſs of the developement of the teeth, and afterwards the ordinary affections which it excites in the conſtitution.

The *period of teething* is ſubject to conſiderable variety in different inſtances; but in the greater number of caſes, the firſt pair of milk-teeth appear between the fifth and tenth month, and the laſt before the end of the ſecond year. In ſome infants, however, the firſt pair or two are cut by the end of the third month; while, on the other hand, not a few attain the ſixteenth or eighteenth month before a ſingle pair appears. In general, thoſe of the lower jaw are cut before the correſponding ones of the upper jaw; but ſometimes the ſeveral pairs of the upper jaw are cut before thoſe of the lower. The following is the order of ſucceſſion in moſt inſtances: *viz.* firſt, the two middle fore-teeth of the lower jaw; then the correſponding pair in the upper: next follow the two adjoining teeth of the upper jaw; and, after theſe, the two next fore-teeth of the lower jaw: then come the two foremoſt grinders of the upper jaw, and after them the two anterior grinders of the lower jaw: the two eye-teeth make their appearance next; and ſome time after, the two oppoſite to them in the lower jaw: and finally, the poſterior grinders. Of the firſt ſet of teeth there are twenty in all, but in ſome caſes only ſixteen: an interval of one, two, or more weeks is interpoſed between each ſucceſſive pair; and there is commonly a longer interval between the firſt two pair than between the ſucceeding ones. Some children, however, cut their teeth croſs, as it is called, or irregularly, the teeth appearing firſt in the upper jaw, and alſo at a diſtance, inſtead of being contiguous to each other: in ſome rare caſes the grinders come out before the cutting teeth. This is accounted, and with ſome reaſon, an indication of difficult or painful dentition.

At birth the teeth are placed underneath the gums, and each tooth is incloſed in a fine membrane or capſule, which is ſuppoſed to be extremely ſenſible. This capſule, as well as the gum, muſt give way before the tooth can be protruded;

and this is accompliſhed merely by the preſſure of the enlarging tooth, which occaſions the abſorption of thoſe parts. In favourable caſes, the preſſure of the teeth on the gums occaſions pain, and an increaſed flow of the fluids furniſhed by the mouth. Hence the infant is fretful, reſtleſs during the night, drivels continually, and frequently thruſts his little hands, or whatever he can get hold of, into his mouth, to rub his gums; and he has occaſionally ſickneſs, gripes, and looſeneſs. At laſt the corner of a tooth is perceived; but the uneaſineſs ſtill continues for ſome days, when a ſecond one is cut. During the interval between the cutting of the lower and upper teeth, he recovers his ſtrength and uſual good health; but is ſoon again ſubjected to the ſame uneaſineſs.

Were theſe the only complaints which attend teething, little danger might be apprehended; but ſometimes many very formidable ſymptoms occur. In robuſt healthy conſtitutions, a violent fever frequently precedes the appearance of every tooth; the gums are ſwelled and inflamed, the eyes much affected, the belly bound, the ſkin hot; and there is every now and then continued ſcreaming, with inability to ſuck, and the ſleep is ſhort and diſturbed. Weakly infants, where teething is painful and difficult, are oppreſſed with ſickneſs, loath all kinds of food, loſe their colour, fret perpetually, have a conſtant looſeneſs, and become much emaciated. Some, beſides theſe ſymptoms, are ſubject to convulſions, which recur from time to time, till the tooth or teeth are above the gum. In others, cough, various eruptions on the ſkin, ulcerations in the gums, extending ſometimes over the palate, obſtinate inflammation of the eyes, affections of the urinary organs, and ſometimes moſt alarming determination to the head, are occaſionally the effects of teething. All the ſymptoms are much aggravated, if ſeveral teeth be cut at once, or in immediate ſucceſſion.

It is of great importance to be able to aſcertain when any of the diſtreſſing ſymptoms, thus enumerated, ariſe from dentition. This is to be done by a careful examination of the ſtate of the gums. Previous to the protruſion of any tooth, the ſeam, which may be diſtinctly obſerved on the edge of each gum, like a doubling of the ſkin, is done away, and the upper ſurface of the gum is rendered flat and broad, or is elevated in the form of a ſmall ſwelling. The gum of the upper jaw is more apt to appear on the ſtretch than that of the lower. It is not eaſy to diſtinguiſh when the infant ſuffers pain from any part of the gum being preſſed upon; otherwiſe that might aſſiſt in pointing out the advance of ſome particular tooth or teeth, becauſe ſuch a degree of fretfulneſs attends teething, that every attempt to feel the ſtate of the mouth never fails to irritate the child.

An eſtimate of the danger attending dentition is to be formed chiefly from the nature of the ſymptoms. Experience proves that puny delicate infants often ſuffer leſs than the moſt healthy and robuſt. In this climate it has been found that ſummer is a more favourable ſeaſon for teething than winter. Some infants cut their fore-teeth without any pain or difficulty, but are much diſtreſſed while cutting the grinders or eye-teeth; although, when the protruſion of the firſt two pair of fore-teeth is accompanied or preceded by great uneaſineſs, there is reaſon to fear that the individual will ſuffer during the whole period of teething: yet the converſe of the propoſition does not hold good; that is, where little derangement of health attends the firſt pair or two, it is not to be concluded that all the other teeth are to advance with the ſame facility. It is well known, that during teething every acute diſeaſe is more than uſually dangerous; and it is alſo a well eſtabliſhed fact, that infants, in a crowded city, are more liable to pain and alarming ſymptoms at that time of life than thoſe reared in the country.

The treatment of the ordinary complaints attending teething, ſhould conſiſt in moderating the pain, in regulating the ſtate of the bowels, and in the continued employment of every means calculated to promote the general health of the infant. With theſe views, ſmall quantities of anodyne balſam may be rubbed on the back-bone at bed-time, when the infant ſeems to be greatly pained. He ought to be fed with beef-tea twice a-day, if weakly, and if his bowels be looſe; and ſhould be kept as much as poſſible in the open air when the weather is favourable; the cold bath ought not to be laid aſide in theſe caſes, unleſs other concurrent diſorders ſhould render it neceſſary, as nothing is more conducive to promote general ſtrength. Looſeneſs, if exceſſive, muſt be moderated; and if the belly be bound ſhould be artificially induced by gentle laxative medicines. When reſtleſs during the night, the child ſhould be taken out of bed, and carried about in a cool airy room; and if not relieved in a ſhort time, he ought to be put into a warm bath. Finally, he ſhould be allowed ſomething to rub his gums with, which will both gratify his wiſhes, and tend to promote the abſorption of the parts incloſing the tooth. A piece of wax-candle, or of recent liquorice-root, is preferable to coral; though the latter ſubſtance is in no other reſpect injurious than that it may be, by awkwardneſs, forced into the noſtril or eye.

The management, when alarming ſymptoms take place, muſt be varied according to circumſtances; but in every caſe the indications to be fulfilled are, to cut aſunder the parts which reſiſt the protruſion of the tooth or teeth, and to palliate diſtreſſing or troubleſome complaints. Some of theſe, which occur alſo under other circumſtances, will be noticed immediately. See alſo DENTITION. Hamilton's Hints, &c. p. 73, *et ſeq.*

Canker of the mouth, cancrum oris, as it has been called, is moſt commonly connected with dentition; it is ſometimes troubleſome to remove, but commonly a trivial complaint. It ſometimes makes its appearance in the firſt month, Dr. Underwood ſays; at others, about the time of teething; and frequently at the age of ſix or ſeven years, when children are ſhedding their firſt teeth, and the ſecond are making their way through the gums. It conſiſts of little foul ſores covering the gums, and extending ſometimes to the inſide of the lips and cheeks. It is ſaid to occur during teething moſt frequently where the gums have not been lanced. It is generally eaſily cured by keeping the body open, and by the uſe of ſome mild aſtringent application to the mouth. As much white vitriol, or rock alum, as will give a moderate roughneſs to a little honey, is uſually ſufficient for this purpoſe; or if it ſhould not effect a cure when the complaint makes its appearance at the time of teething, it will generally go away as ſoon as the teeth are protruded. The worſt ſpecies of this complaint, witneſſed by Dr. Underwood, has occurred during the ſecond period of dentition, when a child has been ſhedding a number of teeth together, leaving the decayed ſtumps behind, which have been neglected to be drawn out. The whole gums will then ſometimes be ſpongy, or diſſolve into foul ſpreading ulcers; and ſmall apertures will be formed, communicating from one part to another, accompanied with an oozing of a fetid and ſometimes purulent diſcharge. If the ſtumps of the decayed teeth are eaſily acceſſible, they ought to be extracted, and ſome aſtringent applications made to the parts, conſiſting of myrrh, Peruvian bark, alum, or cryſtals of tartar, made into a paſte with honey of roſes, or lotions made with the ſame ingredients, aſtringent tinctures, or mineral acids.

§ 4. *Bowel Complaints.*—Under this head we ſhall include the diſorders of the whole of the alimentary canal, and of the organs connected with it, both by function and ſtructure. Theſe conſtitute, perhaps, the moſt important tribe of the diſeaſes of children; inaſmuch as they not only produce conſiderable diſtreſs by their direct effect in deranging the functions, but are likewiſe indirectly the ſource of numerous, ſevere, and even fatal conſtitutional maladies, both chronic and acute. The diſorders of the ſtomach, indeed, are ſeldom very formidable or troubleſome in early life; but the derangements of the biliary ſecretion, of the inteſtinal canal, and of the meſenteric glands and abſorbents, which are much connected with each other, are productive of much miſchief during the whole period of infancy and childhood.

Sickneſs and Vomiting.—A ſlight degree of ſickneſs is a very common occurrence in infants, as their ſtomach is ſo irritable, that it readily rejects any overload of food. But this ſpontaneous puking is attended with little violence to the ſtomach; the milk, or other aliment, ſeems to come up without any ſenſible action of the part, or any reaching effort of the child: and when the food is brought up immediately after ſucking or feeding, and in an almoſt unchanged ſtate, ſuch ſickneſs is obſerved to be not incompatible with a thriving ſtate. Unleſs when the ſickneſs is extremely violent, therefore, or long continued, it is ſeldom neceſſary to interfere. But when means are required to moderate or to allay it, we muſt endeavour to aſcertain the cauſe of the vomiting, and apply them accordingly. The cauſes of ſickneſs at the ſtomach in infants are either ſome altered condition of the nurſe's milk, or the preſence of ſome indigeſtible ſubſtance in the ſtomach. If the nurſe have been under the influence of any violent emotion of the mind, or if ſhe have begun to be out of order, or even to have the feelings preceding that event, it may be concluded that there is ſome morbid change in the milk. During the progreſs of teething, the increaſed quantity of ſaliva, together with its acrimony, proves occaſionally the cauſe of ſickneſs. In ſuch caſes the ſtomach may require the diſcharge of its contents by means of a gentle emetic: a little warm water or chamomile tea, or, at the moſt, ſome preparation of ipecacuan, will anſwer this purpoſe. Antimonials, in doſes which excite vomiting, are frequently injurious to infants, and ſometimes actually ſink, with great rapidity, the living powers. When the vomiting is kept up by irritability of the ſtomach, which is ſometimes the conſequence of its actions having been diſturbed by a cauſe already removed, ſlight cordials and aromatics may be given to ſtrengthen the organ and abate its ſenſibility, and if theſe fail, ſome ſtimulant or anodyne may be applied externally.

It muſt be obſerved, however, that habitual vomiting from over-diſtention of the ſtomach, to which many infants are liable, may lay the foundation for future weakneſs of the digeſtive organs, and ſhould therefore be guarded againſt by every precaution. For this reaſon, infants ought not to be allowed to ſuck too much at a time, and large quantities of ſpoon-meat ſhould never be given in the early months.

Diarrhœa or *Looſeneſs.*—The natural appearance of the ſtools of infants ſhould be familiar to every practitioner. In general the colour is that of a bright orange, the conſiſtence is pulpy and curdled, and the ſmell is not offenſive. Any deviation in theſe reſpects marks ſome diſeaſed ſtate of the ſtomach or bowels. During infancy, from two to four evacuations, within the twenty-four hours, ſeem neceſſary and uſeful; and even where that number is exceeded, it is not to be regarded as injurious, unleſs the health be impaired, or the fleſh be rendered flabby. The appearance of the ſtools, in caſes of diarrhœa, is very various. When they are green, and at the ſame time emit a ſour ſmell, which ariſes from the prevalence of acidity in the firſt paſſages, there is generally griping and fretfulneſs, but the complaint is not dangerous. It generally yields to a laxative, or, in very young infants, to a medicine compoſed of a little magneſia and rhubarb, with a little diſtilled water of dill or penny-royal, with a few drops of ammoniacal ſpirit, or of the compound tincture of camphor. The nurſe's food ſhould be regulated in this caſe, and the infant ought to have no other food, in addition to the milk, than arrow-root.

Slimy ſtools are generally the effect of expoſure to cold, though they occaſionally ariſe from ſome irritation or accumulation in the bowels. In both caſes they are apt to be ſlightly ſtreaked with blood. If there be violent pain, or ſymptoms of fever, introſuſception is to be dreaded. A doſe of cold-drawn caſtor oil, together with the warm-bath, or fomentation of the belly with flannels wrung out of hot water, are commonly all that are neceſſary, if the diſeaſe be attended to at the beginning. Where ſlimy ſtools are of the colour of clay, and emit a putrid ſmell, the infant ſoon becomes emaciated, and the diſeaſe often terminates fatally, though its progreſs be ſlow. Alteratives, with opiate frictions and occaſional purgatives, afford the chief means of relief. If the infant be ſtill at the breaſt, the milk ſhould be changed, a practice which ought to be adopted in every inſtance where there is great tendency to looſeneſs.

The moſt diſtreſſing caſes of diarrhœa are thoſe in which the ſtools are liquid, brown, black, or clay-coloured, and of an offenſive ſmell. As the diſorder proceeds, very unfavourable ſymptoms occur, ſuch as emaciation and dryneſs of the ſkin, ſwelling or ſhrinking of the belly, with an altered appearance of the countenance; and there is a conſtant fretting or peeviſhneſs of temper. Swellings of the glands of the groin, and a little uneaſineſs of breathing, as if there were a ſlight tendency to cough, are alſo very unfavourable ſymptoms. In many of theſe caſes the purging is the effect of a diſeaſed ſtate of ſome of the digeſtive organs, or of the meſenteric glands; but in others it ariſes from an irregular action of the former organs. In theſe diſorders ſome practitioners begin the treatment by the uſe of emetics; but the advantages of theſe medicines are not very obvious, while the diſadvantages reſulting from their debilitating and irritating qualities in the ſtomach are ſometimes unequivocal. On the whole, the continued uſe of alterative medicines, which maintained a ſteady but gentle action upon the alimentary canal and the adjoining viſcera, ſeems to be the moſt ſucceſsful treatment in theſe complaints; the phyſician, at the ſame time, correcting and modifying their operation according to circumſtances, and palliating urgent ſymptoms. Part of the diet, in theſe caſes, ſhould conſiſt of weak beef tea or chicken broth, with rice, or boiled cow's milk with baked flour, or arrow-root. The occaſional uſe of injections of thin ſtarch and laudanum, in the proportion of eight or ten drops of the latter to two table-ſpoonfuls of the former, may be employed to moderate the diſcharge when the ſtrength is much reduced.

Of the ſevere and often fatal ſpecies of diarrhœa, juſt alluded to, there is one form which is known in Scotland by the name of the "*weaning braſh*," and which has been well deſcribed by Dr. Cheyne. (Eſſays on the Diſeaſes of Children. Eſſ. ii.) It occurs after weaning a child too ſuddenly, eſpecially at an unfavourable ſeaſon, as the autumn. It commences, ſometimes two or three days after weaning, but frequently not for three or four weeks, with a purging and griping, and green ſtools. This, being erroneouſly aſcribed to teething, is perhaps neglected, and the ſymptoms increaſe, a retching and vomiting ſupervene, and are gradually followed by a loathing of every kind of food, emaciation and ſoftneſs of the fleſh, reſtleſſneſs, thirſt, and fever of a hectic character. But the moſt characteriſtic ſymptom of this diſeaſe is a conſtant peeviſhneſs, the effect of unceaſing griping pain, expreſſed by the whine of the child, but eſpecially by the ſettled diſcontent of its features. In the progreſs of the diſeaſe, the evacuations from the belly ſhew very different actions of the inteſtines, and great changes in the biliary ſecretion; for they are ſometimes of a natural colour, at other times ſlimy and aſh-coloured, and ſometimes lienteric. The diſeaſe ſeldom proves fatal before the ſixth or ſeventh week; but ſometimes an earlier termination is ſuddenly produced by inceſſant vomiting and purging, or by convulſions, from the extreme irritation in the bowels.

By diſſection Dr. Cheyne aſcertained the ſtate of the viſcera in children who had died of this diſeaſe. In every caſe the inteſtinal canal, from the ſtomach downward, abounded with ſingular contractions, and had in its courſe one or more intus-ſuſceptions; the liver was exceedingly firm, larger than natural, and of a bright red colour; and the gall-bladder, which was enlarged, contained a dark-green bile. In ſome diſſections the meſenteric glands were found ſwelled and inflamed; in others, however, they were ſcarcely enlarged, and had no appearance of inflammation. It is probable, therefore, that this diſeaſe is owing to an increaſed ſecretion of acrid bile, or rather to the morbid ſtate of the liver which occaſions this; and that the extremely irritable ſtate of the whole abdominal viſcera, marked by the ſpaſmodic contractions and intus-ſuſceptions, &c. is occaſioned by the preſence and paſſage of this acrid excretion.

As the exciting cauſe of this *weaning braſh* is apparently too ſudden an alteration of the diet of a child at an unfit ſeaſon, it follows that children ought at all times, but more particularly in the autumn, to be weaned gradually, and well accuſtomed to the food on which they are afterwards to ſubſiſt before they are finally taken from the breaſt. At the beginning of the diſeaſe, or even later, when the attack is ſlight, Dr. Cheyne recommends a doſe or two of rhubarb, to the extent of five or ſix grains, at the interval of two days between each doſe; and that, in the mean time, the child ſhould take half or a third part of a grain of ipecacuan powder, mixed with ſix or eight grains of prepared chalk, and a ſmall portion of ſome aromatic powder, as caſſia, every four or five hours. A ſtarch glyſter, with five or ſix drops of laudanum in it, may be adminiſtered at bed time with advantage, if there be much griping along with the purging. The ſucceſs of theſe remedies, however, will depend upon a ſtrict attention to diet. An animal diet produces leſs irritation than one which is ſolely compoſed of vegetable matter. Eggs, the finer kind of light ſhip-biſcuit, or arrow-root, cuſtard, the juice of lean meat, plain animal jellies, broths freed from their oily part, and milk, are proper articles of nouriſhment. The breaſt milk might perhaps be reſtored with advantage. Vegetables of all ſorts, particularly fruits, acids, and compoſitions of which ſugar or butter form a part, and fermented liquors of every kind ſhould be ſtrictly prohibited. The feet ſhould be kept warm by woollen ſtockings, and flannel worn next the ſkin; and the warm bath and fomentations may be frequently uſed to alleviate the continual ſpaſms. Dr. Cheyne, however, taught by ſubſequent experience, recommends ſmall doſes of calomel as the moſt effectual remedy againſt the weaning braſh, and other chronic forms of bilious diarrhœa. He generally gave half a grain of calomel, morning and evening, or a grain every night, for a week or ten days. After the third or fourth doſe there is generally a great change, he ſays, in the colour of the alvine diſcharge; it becomes of a dark mahogany colour, and is in general more offenſive. When this change takes place it produces a favourable change in the diſorder. Soon afterwards, the children become free from fever, more placid, and in a day or two more their appetite returns, with their former complexion, and every other demonſtration of health. He never found, he adds, in the many caſes in which he has given calomel, that it produced ſalivation, or any other unpleaſant effect. Cheyne, Eſſay ii. On the Bowel Complaints more immediately connected with the Biliary Secretion.

Coſtiveneſs.—This oppoſite condition of the bowels, though ſeldom occurring in young infants, is productive, in children a little more advanced, of many diſtreſſing complaints. Some infants, indeed, ſeem to be habitually coſtive; and there is certainly a conſiderable variety, in reſpect to the ſtate of the bowels, in different individuals. But what may be properly termed coſtiveneſs is never to be regarded as a natural deviation peculiar to any infant: it is always the effect of diſeaſe, or of the nurſe's milk, or of the food. If one copious evacuation take place every twenty-four hours, and the infant be thriving, there is no occaſion for interference; but if there be any greater torpor of the bowels than this, ſuitable remedies are to be employed. It is generally proper to treat the caſe at firſt as if it were the conſequence of diſeaſe; and on this account a briſk laxative may be given every day, for four or five times ſucceſſively. The beſt laxatives for infants are manna, calcined magneſia, calomel, and cold drawn caſtor-oil; and Dr. Hamilton recommends a laxative ſyrup, prepared with treacle and a ſtrong infuſion of ſenna.

Where theſe means fail, there is reaſon to attribute the coſtiveneſs to the nurſe's milk. Sometimes that peculiar ſtate of the milk may be altered by regulating the diet, and opening freely the bowels of the nurſe. While proper means are tried for this purpoſe, the infant's bowels are to be kept clear by ſome mild laxative. But if it be found that the milk ſtill poſſeſſes that injurious quality, the nurſe ſhould, if poſſible, be changed. Where this cannot be done, four or five drops of antimonial wine may be given to the infant every night at bed-time, and inſtead of the ordinary food, panada, made with ſmall beer and treacle, ſhould be ſubſtituted.

Temporary coſtiveneſs may be at any time removed by a ſuppoſitory, made of a ſmall piece of yellow ſoap, ſhaped like a very large Dutch writing-quill. This may be rendered more powerful, if neceſſary, by being dipped, previous to uſe, into ſome powdered ſea-ſalt. Suppoſitories are more efficacious in infants, and much more eaſily managed than glyſters, though theſe latter means are alſo ſometimes uſeful. In caſes of obſtinate conſtipation, attended with ſymptoms of great oppreſſion, aloës, ſuſpended in treacle or ſyrup, is more powerful than any other laxative; from four to eight grains may be thus given for a doſe. Many practitioners err, Dr. Hamilton affirms, by directing too ſmall doſes of laxative medicines for infants.

At a more advanced period of childhood, a morbid ſtate of the alimentary canal, of which *coſtiveneſs* is a conſpicuous ſymptom, frequently occurs, and is the ſource of ſeveral varieties of diſeaſe, both chronic and acute, which conſtitute perhaps the moſt frequent maladies of the puerile age. The firſt of theſe, to which we ſhall direct the attention of the reader, has been called, by Dr. Hamilton, ſenior, phyſician to the Royal Infirmary at Edinburgh, maraſmus, See his Obſervations on Purgative Medicines, chap. iii. edit. 2d.

Maraſmus includes a variety of ſymptoms which affect children of both ſexes. The diſeaſe ſteals on gradually, and the following are the early ſymptoms by which it is characterized: a ſluggiſhneſs, and laſſitude on ſlight exertion, depravity and loſs of appetite, a flabbineſs and waſting of the muſcular fleſh, fulneſs of the features, and paleneſs or paſty colour of the countenance, ſwelling of the upper lip, a conſtant itching of the noſe, fœtid breath, with a ſwelling of the belly, an irregular and generally coſtive ſtate of the bowels, and a change in the colour and odour of the fæces. When theſe ſymptoms have continued for ſome time other more urgent complaints enſue. There is an alternate paleneſs and fluſhing of the countenance, followed by heat and dryneſs of the ſkin, feeble and quick pulſe, thirſt, great fretfulneſs, increaſing debility, and diſturbed ſleep, during which the little patients grind or gnaſh their teeth, and are ſubject to involuntary ſtarting, and twitching of the different muſcles, and, when awake, to a conſtant picking of the noſtrils or lips, or even of the eyes, and to involuntary geſticulations, approaching to convulſions.

Every caſe of *maraſmus* does not neceſſarily include all theſe ſymptoms; for they occur in different combinations. The diſeaſe appears moſt commonly among weak and infirm children, whether they are ſo from delicacy of conſtitution, or from incidental cauſes. It is particularly prevalent in large and populous cities, where children are deprived of ready acceſs to exerciſe in pure air, and ſicken and pine in the nurſery; or when they are confined in crowded and airleſs ſchool-rooms, whither they are ſent, partly for the purpoſes of education, and partly, to uſe a common phraſe, with the view of being kept out of harm's way. Children alſo, who are employed in manufactories, where their occupation and confinement are ſuch as to weaken and enervate them, are liable to be attacked with this diſeaſe. Irregularity in diet and improper food alſo give riſe to maraſmus. It is accordingly obſerved to prevail moſt in the ſummer and autumn, the ſeaſons which afford an opportunity of eating unripe fruit and vegetable articles from the garden.

Maraſmus has generally been attributed to the preſence of worms in the alimentary canal. But the *aſcarides*, which are often paſſed in great numbers by children, are not accompanied, except incidentally, by the ſymptoms of maraſmus; and the *tænia*, or tape-worm, is altogether unknown in infancy and childhood. The *lumbricus*, or round worm, muſt therefore be the generally ſuppoſed cauſe of the ſymptoms of maraſmus. But the diſeaſe occurs, in numerous inſtances, and is cured, when no worms are ſeen; and, on the other hand, the preſence of *lumbrici* in the bowels is by no means an uniform cauſe of bad health, and has been frequently noticed when maraſmus did not occur. Various anthelmintic medicines, however, have been ſucceſſively in vogue for the cure of the diſeaſe, upon the ſuppoſition of the exiſtence of worms; but the utility of ſuch of them as have been found to be moſt beneficial, Dr. Hamilton believes to have been in proportion to the purgative powers which they poſſeſſed. He ſays, "when I conſider the languor and laſſitude which precede this maraſmus; when I recollect the conſtitutional or acquired debility of thoſe who are more particularly expoſed to be affected by it; inſtead of adopting the common opinion of its being occaſioned by worms, I am more diſpoſed to think, that a torpid ſtate, or weakened action of the alimentary canal, is the immediate cauſe of the diſeaſe; whence proceed coſtiveneſs, diſtention of the bowels, and a peculiar irritation, the conſequence of remora of the fæces. I have accordingly been long in the habit of employing purgative medicines for the cure of this maraſmus; the object is to remove indurated and fœtid fæces, the accumulation perhaps of months; and as this object is accompliſhing, the gradual return of appetite and vigour mark the progreſs of recovery." Obſ. on Purg. Med. p. 51.

Since the practical concluſions are the ſame, it is not of material importance by what theoretical views they are ſupported; but we accord with the following obſervations of Dr. Hamilton, junior, (profeſſor of midwifery at Edinburgh, whoſe excellent "Hints for the Treatment of the principal Diſeaſes of Infants, &c." we have before quoted.) "There can be little doubt," he ſays, "that neither the mere accumulation of the ſtools, nor the torpor of the bowels, on which that appears to depend, can explain the various ſymptoms produced by this condition of the digeſtive organs. There is every reaſon to ſuppoſe that there is an altered action, not only in the ſtomach and inteſtines, but alſo in the liver and lacteals, perhaps in all the parts concerned in the digeſtion of the food. When this has continued for a certain time, the accumulation of acrid matter, which is the conſequence, adds greatly to the irritation, and while all this is going on, the circulating juices become depraved." Hints, &c. p. 113.

In the treatment of maraſmus, then, the leading objects are, to remove the accumulating maſs of morbid and irritating fæces from the bowels, to alter the morbid actions of the digeſtive organs, and to palliate the diſtreſſing ſymptoms which occur. The two firſt, which are the curative indications, are both fulfilled by a ſteady and perſevering adminiſtration of purgative medicines.

In the incipient ſtage, while the diſeaſe is mild, the bowels are not altogether torpid and inactive, neither are they overloaded with accumulated fæces. Mild purgatives, therefore, repeated at proper intervals, effect a cure. They preſerve the bowels in proper action, carry off fæces which had begun to be offenſive and hurtful, and prevent farther accumulation. The diſeaſe yields in a few days to this treatment, and all that is farther required is ſome tonic medicine, which ſhall ſtrengthen the ſtomach and bowels, together with a due regulation of diet, and occaſionally a purgative at bed-time, the patient being likewiſe much in the open air. Preparations of iron are found the beſt tonics in theſe caſes; and children readily take the wine of iron, or the filings covered with ſugar. In ſelecting the purgatives, it is neceſſary to flatter the taſte of our young patients. Powder of jalap is not altogether unpleaſant: the mild neutral ſalts, diſſolved in a ſuitable quantity of beef-tea, are alſo convenient purgatives: but calomel will prove, on ſeveral accounts, the moſt certain and uſeful remedy of this kind.

When the confirmed ſtage of maraſmus has been allowed to arrive, manifeſt danger threatens the young ſufferer, whoſe remaining fleſh and ſtrength are rapidly waſted by the ſupervening fever; while proſtration and depravity of appetite withhold neceſſary nouriſhment, and at the ſame time the more inactive ſtate of the bowels, and greater bulk of feculent matter, throw additional difficulties in the way of a cure. Under theſe circumſtances, an active practice ſhould be adopted, with the view of ſtimulating the inteſtines, and of putting the collected maſs in motion without delay. Theſe ends are beſt obtained by giving ſmall doſes of the purgative medicine, and by repeating theſe frequently, ſo that the latter doſes may ſupport the effects of the preceding ones. When the bowels are once opened, ſtronger purgatives, given at longer intervals, will accompliſh the cure.

While the purgative medicines are thus exhibited, it is monly makes ; and for the ſame reaſon, Hoffman gave it the appellation of *Febris lenta infantum*.

The fever in queſtion is moſt commonly preceded for ſome days, and occaſionally for weeks, by ſymptoms of indiſpoſition, much reſembling the early ſymptoms of *maraſmus*. The child is obſerved not to look well, and his colour often changes. He is indolent, ſpiritleſs, and fretful ; frequently picks his noſe, lips, and fingers, even ſometimes till he draws blood : his breath is offenſive, and he is affected with a ſhort dry cough. If he can ſpeak, he complains of pain in his head, or belly, or both : and when ſtill older, he ſays alſo that he is faint and weak. He has a deſire for drink more than for food ; is much troubled with wind ; and his belly is ſometimes larger than natural. In his ſleep, he ſtarts, moans, and makes a grating noiſe with his teeth. His urine puts on a milky appearance almoſt as ſoon as made, and, in a few minutes, depoſits a ſediment of the ſame colour, leaving the body of the urine with very little colour. His bowels are generally in the extreme, being either coſtive or looſe.

After theſe ſymptoms have continued for a longer or ſhorter time, the fever makes its appearance, ſometimes preceded by a diſtinct cold fit, at other times, however, ſo gradual in its approach, that the commencement is not obſerved. It always aſſumes more or leſs of the remittent form, when it is diſtinctly ſeen, and the exacerbations are long, and the remiſſions ſhort, in proportion to the violence of the fever. During the exacerbation all the ſymptoms are increaſed ; there is great heat of ſkin, and the patient is drowſy, and ſleeps, but not ſoundly ; for he ſtarts, moans, talks incoherently, and even ſcreams in his ſleeps. The wind is particularly troubleſome, makes a rumbling noiſe in the bowels, and is exploded copiouſly both upwards and downwards, with manifeſt relief. The cough is more frequent, and the breathing is quickened and oppreſſed. The patient is often ſick, and ſometimes retches, and even vomits phlegmy ſtuff of various colours. The pulſe beats from a hundred and forty to a hundred and ſixty pulſations in the minute. In the remiſſions, all the ſymptoms abate. The patient is wakeful, is attentive to things around him, often inclines to be playful, and is in general averſe to lying in bed. What ſleep he has is uſually compoſed. The pulſe beats from a hundred and twenty to a hundred and thirty ſtrokes in a minute.

Theſe exacerbations and remiſſions often occur with a conſiderable degree of regularity; the exacerbation generally beginning in the evening, and the remiſſion taking place in the morning: but in the more acute form of the diſeaſe, there are one or two ſhorter exacerbations during the day. In the latter caſe, both in the exacerbations and remiſſions the ſkin is commonly dry : when ſweats happen, they are partial, affecting only the head, breaſt, or palms. The belly and palms are always warmer than any other part of the body. Where there is only the nocturnal exacerbation, it is uſually terminated by a profuſe ſweat ; and through the day, the ſkin is temperate, but feels dry and harſh. The patient has no appetite, and ſcarcely any thirſt ; ſo that in many caſes, it is with great difficulty that he can be made to take either food or drink. The ſtate of the bowels is uncertain ; but the ſtools are always unnatural, either as to their colour, conſiſtence, contents, or ſmell : moſt commonly they are morbid in all theſe reſpects ; for they are either whiter or darker than natural ; they are always more offenſive ; are ſeldom without a great deal of ſlime, and ſometimes conſiſt of nothing but ſlime : ſometimes they froth and ferment like yeaſt.

The patients frequently paſs worms in the courſe of this fever, even when they were never known to void any before. Theſe worms are not only thrown off by vomiting and ſtool, but are ſometimes obſerved to work themſelves out of the body both ways, ſeemingly unaſſiſted by any exertions on the part of the patient's organs. But in many caſes of this fever, no worms are ever ſeen.

When the fever is on the decline, the exacerbations grow milder and ſhorter, and at length diſappear one after another ; the appetite returns by degrees ; the ſleep becomes calm and refreſhing, attended with a general moiſture of the ſkin, and the ſtools approach more and more to the natural ſtate, till they become as in health. The duration of this fever, in its more acute form, is from eight or ten days to a fortnight or three weeks ; in the more ſlow and mild form, it will laſt for two or three months or more.

That the cauſe of this remittent fever of children lies in the alimentary canal, and is of the ſame nature with that from which maraſmus, and ſeveral other infantile diſeaſes originate, has not been doubted ſince it was ſo well pointed out by Dr. Butter. It is proved, in the firſt place, by the ſimilarity of the ſymptoms with which it is preceded and uſhered in, and, ſecondly, by the nature of the alvine diſcharges during its continuance, but more eſpecially by the ſucceſs of the practice, which is founded upon this principle, and conſiſts in carrying off the accumulation of morbid excretions from the bowels, and augmenting their ſtrength. The ſame cauſe operating in different conſtitutions, will produce a different ſeries of ſymptoms ; and it is probably from the peculiar irritability of habit in ſome children, that this fever is produced, by the ſame morbid ſecretion and accumulation in the *primæ viæ*, which give riſe to maraſmus, and other chronic maladies in others. " It may be accelerated by cold, fatigue, or the like ;" ſays Dr. Butter, (ſpeaking of the remittent fever,) " but the principal cauſes are crude accumulations in the firſt paſſages, which, with a very irritable prediſpoſition, draw the inteſtinal canal into ſpaſm, &c." whence the irritation is communicated to the reſt of the body, and general fever induced.

Cure of the infantile remittent fever.—The two principal indications of cure are, to allay the febrile irritation, and to remove the great irritating cauſe ; the former of which, although in a great meaſure palliative only, is an object of conſiderable importance. It is extremely deſirable, therefore, that from the firſt occurrence of the febrile ſymptoms, the child ſhould be kept ſtill, and quiet, in a chamber which is of a cool temperature ; that all ſolid food and ſtimulating drink ſhould be cautiouſly abſtained from ; and the ſole ſupport of the patient be diluting and nouriſhing liquors, ſuch as ſmall broth, gruel, and barley-water.

The ſecond, or proper curative indication, is fulfilled by ſuch medicines as keep up a conſtant gentle action upon the bowels, and contribute at once to diſlodge the morbid accumulation, and to correct the morbid condition, of the alvine excretions. This purpoſe may be effected either by the neutral ſalts, or by ſmall doſes of mercurial laxatives, eſpecially in combination with abſorbents. Dr. Butter gives the preference to the former ; and commonly employs the *polychreſt ſalt*, which promotes both urine and ſtools. For a child of five years old (and proportionally for a younger or older ſubject) he diſſolves a drachm of this ſalt in a quarter of a pint of water, ſweetening it with two drachms of ſugar. Of this mixture two ſpoonfuls are adminiſtered every four hours, or at ſuch intervals, when the child is awake, that the whole may be finiſhed in twenty-four hours. This medicine is to be repeated daily, ſo as to promote one, two, three, or four ſtools, according to the circumſtances of the caſe, the larger number in the more acute forms of the diſeaſe. When the fever is attended with a looſeneſs, Dr. Butter interdicts the uſe of the neutral ſalts, and preſcribes the extract of hemlock (*Conium*, Linn.); the quantity of five grains to be taken in the courſe of 24 hours, ſuſpended in water with a little ſugar. It relieves every ſymptom of the fever, he ſays, and at the ſame time gradually carries off the looſeneſs. Under ſimilar circumſtances, we have ſeen eſſential ſervice from ſmall doſes of ſome mercurial, combined with abſorbents, as the *Hydrargyrus cum Creta*, of the London Pharmacopœia; or a grain of calomel united, by rubbing, with a little ſoda and teſtaceous powder. While the *conium* is given as above-mentioned, as much rhubarb may be adminiſtered as will keep the body gently open, where the fever is not very acute.

When there is great reſtleſſneſs and vociferation, the belly ſhould be fomented with flannel cloths, wrung out of a decoction of chamomile, and applied agreeably warm, for twenty minutes or half an hour at a time, as occaſion may require; and this operation ſhould be repeated as often as the ſymptoms return. As the diſeaſe declines, the child may be allowed to return gradually to his uſual diet and way of life; but ſome care will be requiſite, that he may not have his free liberty as to eating, drinking, and exerciſe, until he has recovered his full fleſh and ſtrength; and the medicines above recommended muſt be continued till the fever is quite gone.

Catarrhal fever is not a very frequent diſeaſe during infancy, and when it does occur, ſeldom requires any other treatment, than an emetic at the beginning, an open ſtate of the bowels, and the warm bath every night while it continues. When it extends to the degree of pulmonary inflammation, bliſtering the cheſt is often an effectual remedy, or, in ſtrong children, the application of leeches to the cheſt may be reſorted to. The principle of treatment, indeed, is the ſame in theſe complaints, whether they occur in the early or later periods of life; except that the infantile conſtitution is more eaſily acted upon by remedies, and therefore that a laxative and a bliſter will often accompliſh a degree of alleviation of fever, which more active meaſures will be required to produce in adults. See CATARRH and PERIPNEUMONY.

Among the fevers incident to children, the *acute hydrocephalus*, or water in the head, ſhould be deſcribed; but we have already given the hiſtory of that important diſeaſe in its place. (See HYDROCEPHALUS.) It remains for us to ſay a few words on the ſubject of convulſions.

§ 6. *Convulſive Diſeaſes.*—The ſubject of convulſions, in general, has been treated under its proper head, (ſee CONVULSIONS,) as well as the moſt ſevere modifications of convulſive diſeaſe, the epilepſy and St. Vitus's dance. (See EPILEPSY and CHOREA.) It will, therefore, be ſufficient to ſtate here ſome circumſtances relative to the convulſions of infants in particular. And firſt it muſt be obſerved, that, in conſequence of the peculiar ſuſceptibility of impreſſion in the nervous ſyſtem of infants, many circumſtances excite convulſions at that early age, which have no ſuch effect at a ſubſequent period of life. Accordingly it is well known, that in general the younger the infant is, the more readily do fits occur, and that ſome families are more liable than others to the diſeaſe, apparently from a weak ſtate of the nervous or vaſcular ſyſtem being communicated from the parents. The obvious exciting cauſes are dentition, mechanical injuries, acute diſeaſes, impurities of the air, paſſions of the mind, indigeſtible or poiſonous ſubſtances in the ſtomach or bowels, over-diſtention of thoſe organs, irritations in them from acrid matter or worms, the ſtate of the ſyſtem previous to the appearance of ſmall-pox, meaſles, &c. All theſe act by diſturbing the nervous ſyſtem, and altering or deranging the actions of the veſſels.

In ſome caſes convulſions come on ſuddenly; the infant, from being in the moſt perfect health, turns in a moment livid, his eyes and features are contorted, and his limbs and whole frame are thrown into violent agitations. Theſe ſymptoms are ſucceeded by a ſuſpenſion of the vital powers, as in faintings, which may or may not prove fatal. Sometimes the attack is gradual, and the firſt ſymptoms are not eaſily diſcerned by the attendants: the infant ſhews ſome degree of uneaſineſs; he changes colour, his lips quiver, his eyes are turned upwards, and he unexpectedly, as it were, ſtretches himſelf out, or his hands become clenched. The leſſer degrees of theſe are called by the nurſes *inward fits*. Convulſions commonly precede the fatal termination of moſt of the diſeaſes of infancy, which explains the reaſon of their appearing in the bills of mortality to be of ſuch frequent occurrence. Accordingly, where they take place after any conſiderable indiſpoſition, they are to be regarded as the harbingers of death. But even where the infant had been in perfect health previous to the attack, the event is always to be conſidered as extremely uncertain, for a ſingle fit may kill. In ordinary caſes, the danger is to be eſtimated by the degree of violence of the fit, and by the cauſe which had produced it. Thus if the cauſe be ſome irritation, which is naturally of temporary duration, or which can be eaſily removed, a favourable event may be looked for; but if it be not obvious, it may be ſuſpected to be ſome ſtate of the brain, which admits of no remedy. In many inſtances, where it was impoſſible to diſcover the cauſe of the fits during life, an accumulation of water within the ventricles of the brain has been found after death.

There is no medicine poſſeſſed of any ſpecific power in ſuppreſſing convulſions, although cochineal, miſletoe, muſk, and other ſubſtances, have been at different times extolled for ſuppoſed virtues of this nature. One of the moſt effectual means of alleviating the fits, is to immerſe the child, during their attack, in a tubful of water, heated to 96° of Fahrenheit's thermometer, or to a warmth that the hand can eaſily bear. In very young infants opiates are not always ſafe, and cannot be truſted in the hands of nurſes or inexperienced perſons; but in children upwards of eighteen months, where the warm bath does not ſpeedily ſucceed in abating the convulſions, from one or two to four or five drops of the tincture of opium might be adminiſtered, according to the ſeverity of the fits: or a proportionate quantity of the camphorated tincture of opium, or of the extract of poppies diffuſed in a little water. Profeſſor Hamilton has recommended a ſubſtitute for opium, which may be given to younger children; namely, the tincture of *hyoſcyamus*: "twenty drops, evening and morning, have been repeatedly given to infants within ſix months of age." He remarks, that, when the convulſions have been the effect of hooping-cough, great benefit has been derived from this medicine. Camphor, in the form of glyſter, has ſeemed ſerviceable in ſome few caſes, the ſame author ſtates, but chiefly in children beyond the ſecond year. He adds, "when a child ſeems to be ſuddenly deprived of life by one or two fits, if he appeared previouſly in good health, he ought on no account to be conſidered as irrecoverably loſt; but the common means for reſtoring ſuſpended animation ſhould be carefully employed, as long as his colour is not entirely changed." Hints, &c.

Some other diſeaſes, which occur in infancy and childhood, might here have been deſcribed; eſpecially the glandular affections, both internal and external; the various diſorders of the ſcalp, as the ſcald-head, ring-worm of the ſcalp, &c.; the rickets, and ſo forth. But ſome of theſe are not peculiar to the age of childhood, and others are ſufficiently important to be diſcuſſed more at length. See TABES *meſenterica*, or meſenteric conſumption; SCROFULA, PORRIGO, RICKETS.

The *prevention of diſeaſes* in children depends principally on the regulation of the diet and clothing, ſleep, exerciſe in the open air, and cleanlineſs. On the ſubject of the two or three laſt points we have little to ſay, as the value of a proper attention to them is now generally underſtood. In regard to diet, it may be ſufficient to ſtate, that, after weaning, preparations of milk, of eggs, of vegetable and animal jellies, ſhould precede ſolid animal food; that, during childhood, a proper proportion of animal and vegetable matter ſhould be uſed; and that all condiments, except ſalt, are unneceſſary, and all ſpirituous fermented liquors pernicious. In reſpect to clothing, it is important to obſerve, that the attempts to rear children in a hardy manner, by allowing their legs to be bare, and other parts of the body to be much expoſed (a practice ſanctioned by ſome great names) have proved moſt unſucceſsful; for by theſe means not only has the growth been, in many inſtances, ſtinted and perverted, but the conſtitution has been much injured, and, in ſome caſes, life abſolutely deſtroyed, in conſequence of inflammations of the lungs and bowels, or various ſcrofulous affections, thus excited. It would appear, indeed, that ſcrofulous and conſumptive diſeaſes owe their origin principally to the cold and humidity of our climate, and the deleterious influence of theſe cauſes upon the conſtitution in childhood was ſtrikingly illuſtrated in the attempt lately made by the Sierra Leone Company to form an eſtabliſhment for the education of African children in this country. Mr. John Pearſon, who ſuperintended this inſtitution, ſtates that they all died of conſumption: they almoſt uniformly became ſcrofulous; they bore the firſt winter tolerably well, but drooped during the ſecond, and the third generally proved fatal to them; inſomuch that it became neceſſary to abandon the plan. Now we cannot but deem the ſituation of a child, who is to be hardened by thin clothing, as analogous to that of theſe African children, and to believe that, by ſuch deluſive attempts to give ſtrength, the perfect and healthy evolution of the ſyſtem is prevented, and the foundation laid for ſcrofula, conſumption, and other chronic diſeaſes.

INFANTS, *Running Eyes of*. See OPHTHALMY.

INFANTS *at Bethlehem*, *Slaughter of*, *by Herod*, a fact mentioned in the goſpel of St. Matthew, chap. ii. 16.; but diſputed on account of the ſilence of Joſephus, who has written the hiſtory of the Jews, and particularly the reign of Herod. The fact is not in itſelf improbable nor incredible, if we conſider the cruelty of Herod's diſpoſition and other ſavage acts of which he was guilty (ſee HEROD), and more eſpecially if we recollect, that the ſlaughter, mentioned by St. Matthew, was perpetrated upon the occaſion of tidings brought to Jeruſalem, of the birth of one who was "king of the Jews." Joſephus, who has given an account of a terrible execution made in Herod's court, and at Jeruſalem, about the ſame time, upon the occaſion of ſome predictions, that God was about to take away the kingdom from Herod, might omit the murder of the infants at Bethlehem from a fear of being charged with a deſign to load Herod unreaſonably, or a fear of rendering his hiſtory diſagreeable by too particular a detail of cruel actions. The ſilence of Joſephus, it is ſaid, is no more an objection againſt St. Matthew, than the ſilence of other writers with regard to facts mentioned by Joſephus is an objection againſt him. Joſephus, however, if he was a firm Jew, as moſt writers have ſuppoſed, had a particular reaſon for paſſing over this event at Bethlehem, becauſe he could not have mentioned it, without giving great advantage to the Chriſtian cauſe. If he had written that Herod, at the latter end of his reign, had put to death all the young children at Bethlehem, on occaſion of a report ſpread at Jeruſalem, that the "king of the Jews" had been newly born there, he would very much have gratified the Chriſtians; ſince it was well known, when he wrote, that about thirty years after the death of Herod, Jeſus, being then about thirty years of age, had been ſtyled the "king of the Jews," and had been publicly crucified at Jeruſalem with that title; and it was firmly believed by all his followers, that he was the great perſon ſpoken of under that character, and was now advanced to dominion and power. If Joſephus did not wiſh to ſerve the Chriſtians and their cauſe, he would therefore be ſilent with regard to this fact. But it has been alleged, that the Greek and Roman hiſtorians are ſilent with reſpect to this event: but this may eaſily be accounted for, if we conſider, that the Roman empire was at this time ſo extenſive, that the affairs of many dependent princes have been loſt in the crowd. Nevertheleſs, St. Matthew's account is confirmed by the teſtimony of ancient Chriſtian authors. Juſtin Martyr, Irenæus, Origen, and other Chriſtian writers have mentioned the fact. Moreover, there is alſo a noted paſſage in Macrobius, a heathen author, who flouriſhed in the latter end of the fourth century, who, among other jeſts of Auguſtus, has this: "When he (Auguſtus) had heard that among the children within two years of age, which Herod king of the Jews commanded to be ſlain in Syria, his own ſon had been killed, he ſaid, "it is better to be Herod's dog than his ſon." Macrob. Sat. l. ii. c. 4. This paſſage, if we deduce no other inference from it, ſhews, that Herod's ſlaughter of the infants in Judea was a thing well known in Macrobius's time, and was not conteſted by the heathens. See Lardner's Works, vol. i. chap. 2.

INFANTA, in *Geography*, a river of Africa, which runs into the Indian ſea, S. lat. 32°.

INFANTE and INFANTA, are titles of honour given to the children of ſome princes; particularly thoſe of the houſes of Spain and Portugal.

It is uſually ſaid, that the appellation of infanta was introduced into Spain on occaſion of the marriage of Eleanor of England with king Ferdinand of Caſtile: and that their ſon Sancho was the firſt that bore it. But this is contradicted by Pelagius, biſhop of Oviedo, who lived in the year 1100, and who informs us, that the titles infante and infanta were uſed in Spain ever ſince the reign of king Evremond II.

INFANTICIDA, in *Mythology*, the name of a deity to whom, according to Lycophron, children were ſacrificed by the Greeks. It is not likely that this was originally the name of any ſeparate deity; but from the lamentable frequency of this almoſt incredible offering, this horrible diſtinction was appropriately applied to, moſt probably, Hecate, or ſome other form of the goddeſs Diana, of multifarious names and characters. The ſubject of infanticide has lately undergone more than uſual diſcuſſion, and the prevalence of the practice, both heretofore and exiſting, proved of greater extent than could have been imagined. See the following article.

INFANTICIDE, or child murder, is an enormity that our reaſon and feelings would lead us to reckon as a crime of very rare occurrence. That it ſhould exiſt at all is, at the firſt view, ſurpriſing,—that it ſhould prevail to any extent is difficult of belief,—that parents ſhould be its perpetrators is in a high degree painful to imagine; but that mothers ſhould be the executioners of their own offspring, nay, their habitual and ſyſtematic executioners, is ſuch an agonizing contemplation, ſuch an outrage on humanity, as every amiable feeling of our nature ſickens and revolts at. But that this lamentable cuſtom is, notwithſtanding, extenſively prevalent, has lately been developed ſo demonſtratively, that, however comfortable it may be to our wounded ſenſibility to indulge the hope of error, it is, unhappily, the wantonneſs of ſcepticiſm to doubt. To try, however, as it would ſeem, the ſketch of our credulity, we are imperatively called upon to believe this unparalleled enormity of a race, heretofore ſuppoſed to be the moſt humane in exiſtence; *viz.* of the Hindoos: but of that race, which is among the moſt tender in other reſpects, we are conſtrained to believe that by them this ſad deed has been ſyſtematically and univerſally perpetrated!

A few years ago it was diſcovered by Mr. Duncan, then reſident at Benares, that a ſect of Hindoos in that neighbourhood, called Ràj-kùmàr, was in the habit of deſtroying all their female infants. A notice of this extraordinary fact was ſoon after publiſhed in the fourth volume of the Aſiatic Reſearches, by ſir John Shore (now lord Teignmouth), then governor-general of India. Mr. Duncan ſucceeded in perſuading this deluded tribe to relinquiſh their barbarous habit; and ſo effectually, that no inſtance has ſince been diſcovered of an infringement of the written penal obligation that the chiefs and other individuals of that tribe then voluntarily entered into. As well as the Ràj-kùmàrs, other ſects of Hindoos, in the vicinity of Benares, were found to have been in ſimilar habits, though to a leſs extent, and they executed a ſimilar deed of renunciation.

The ſame gentleman, the Hon. Mr. Duncan, now governor of Bombay, in the year 1800, being at Surat, heard incidentally that on the weſtern ſide of India alſo, and eſpecially in the contiguous countries of Guzerat, Kutch, and Sind, infanticide was extenſively practiſed; due enquiry amply confirmed the fact. Availing himſelf of the recently improved connection between the Britiſh government and that of the Gaikawar, or ſovereign of Guzerat, Mr. Duncan, through the able and zealous co-operation and agency of colonel Walker of the Bombay eſtabliſhment, our political reſident and military commander in Guzerat, again ſucceeded in the entire and effectual abolition of the cuſtom; all the chiefs of the tribes in which it had obtained binding themſelves and their families, and adherents, to a permanent renunciation and diſcontinuance of it; rendering themſelves, in default of a due obſervance of the agreement, obnoxious to penal inflictions on the part of the Britiſh and Gaikawar governments.

Among the military tribe of Jàrejàh, infanticide was found moſt common; ſo common, indeed, that a Jàrejàh female was very rarely ſeen or heard of. The men of this tribe procured wives from others who reared their daughters. The number of infants, thus ſacrificed, amounted, by one computation, to 30,000 annually, in the peninſula of Guzerat alone: but this colonel Walker deemed an exaggeration. Another eſtimate, erring probably on the other hand, reckoned 2000 as nearer the annual amount. It appeared to be the univerſal practice to deſtroy the infant immediately on its birth: this was done generally by the midwife, or ſome female attendant; ſometimes, however, by the mother! The father never interfered, and the name or ſubject of a daughter was never mentioned in his preſence. Sometimes the infants were ſmothered in various ways, or ſuffered to expire from want of nurture: different methods of deſtruction are related, and it ſeems to have been a matter of indifference how, provided the inhuman deed were done.

In the contiguous countries of Kutch and Sind, infanticide alſo prevails: but it has not been aſcertained to what extent. It is recognized and avowed by the perſons poſſeſſing the powers of government, who aſſert the antiquity of the uſage, and forbid any interference on our part with a view to its abolition: our endeavours to effect that ſalutary end have in thoſe quarters entirely failed.

It is, however, a conſoling fact to reflect on, that ſolely through Britiſh interpoſition this cuſtom has been put an entire ſtop to throughout the vaſt extent of our influence in India. None of the former governments, whether Hindoo or Mahometan, of the countries comprehended within that term, appear ever to have made any effort toward working ſo deſirable a reform, although the religious tenets of both pointedly prohibit the practice.

Theſe particulars we have gathered from a recent publication by major Moor, on "Hindoo Infanticide;" wherein he has given at length all the correſpondence and negociations that led to its diſcovery and ſuppreſſion in India; with notices of a ſimilar cuſtom, which, and the expoſure of children, he proves to have prevailed both in ancient and modern times among many nations in almoſt every part of the world. He adduces many ſpeculations on its exiſtence, origin, and effects; extending, indeed, to a lengthened diſcuſſion on a ſubject that, as much as any on record, evinces the almoſt incredible inconſiſtency and weakneſs, and wickedneſs of man. See Infanticida.

INFANTOS, in *Geography*, a town of Spain, in New Caſtile; 20 miles W. of Alcaraz.

INFANTRY, the body of foot ſoldiers, in an army, or other corps. See Foot.

The infantry ſtand contradiſtinguiſhed from the *cavalry*, or horſe, which ſee.

Europe is unqueſtionably indebted to the Swiſs for a total change in the military ſyſtem, particularly ſo with regard to foot ſoldiers.

Dr. Robertſon, in the firſt volume of his hiſtory of Charles V. p. 105, obſerves, that the ſyſtem of employing the Swiſs in the Italian wars, was the occaſion of introducing a total innovation in the military cuſtom. The arms and diſcipline of the Swiſs were different from thoſe of other European nations. During their long and violent ſtruggles in defence of their liberties againſt the houſe of Auſtria, whoſe armies, like thoſe of other conſiderable princes, conſiſted chiefly of heavy-armed cavalry, the Swiſs found that their poverty, and the ſmall number of gentlemen reſiding in their country, at that time barren and ill cultivated, put it out of their power to bring into the field any body of horſe capable of facing the enemy. Neceſſity compelled them to place all their confidence in infantry; and in order to render it capable of withſtanding the ſhock of cavalry, they gave the ſoldiers breaſt-plates and helmets, as defenſive armour, together with long ſpears, halberts, and heavy ſwords, as weapons of offence. They formed them into large battalions, ranged in deep and cloſe array, ſo that they could preſent on every ſide a formidable front to the enemy. (See Machiavel's Art of War, b. ii. chap. ii. p. 451.) The men at arms could make no impreſſion on the ſolid ſtrength of ſuch a body. It repulſed the Auſtrians in all their attempts to conquer Swiſſerland. It broke the Burgundian Gendarmerie, which was ſcarcely inferior to that of France, either in number or reputation; and when firſt called to act in Italy, it bore down, by its irreſiſtible force, every enemy that attempted to oppoſe it. Theſe repeated proofs of the deciſive effects of infantry, exhibited on ſuch conſpicuous occaſions, reſtored that ſervice to reputation, and gradually re-eſtabliſhed the opinion which had been long exploded, of its ſuperior importance in the operations of war. But the glory the Swiſs had acquired, having inſpired them with ſuch high ideas of their own prowefs and conſequence, as frequently rendered them mutinous and inſolent, the princes who employed them became weary of depending on the caprice of foreign mercenaries, and began to turn their attention towards the improvement of their national infantry.

The German powers having the command of men, whom nature has endowed with that ſteady courage and perſevering ſtrength which form them to be ſoldiers, ſoon modelled their troops in ſuch a manner, that they vied with the Swiſs both in diſcipline and valour.

The French monarchs, though more ſlowly, and with greater difficulty, accuſtomed the impetuous ſpirit of their people to ſubordination and diſcipline; and were at ſuch pains to render their national infantary reſpectable, that as early as the reign of Louis XII. ſeveral gentlemen of high rank had ſo far abandoned their ancient ideas, as to condeſcend to enter into their ſervice.

The Spaniards, whoſe ſituation made it difficult to employ any other than their national troops in the ſouthern parts of Italy, which was the chief ſcene of their operations in that country, not only adopted the Swiſs diſcipline, but improved upon it, by mingling a proper number of ſoldiers, armed with heavy muſkets, in their battalions; and thus formed that famous body of infantry, which, during a century and a half, was the admiration and terror of all Europe. The Italian ſtates gradually diminiſhed the number of their cavalry, and in imitation of their more powerful neighbours, brought the ſtrength of their armies to conſiſt in foot ſoldiers. From this period, the nations of Europe have carried on war with forces more adapted to every ſpecies of ſervice, more capable of acting in every country, and better fitted both for conqueſts, and for preſerving them.

INFANTRY, *Exerciſe*. See EXERCISE.

INFANTRY, *Foreign*. The foreign infantry in the ſervice of Great Britain, according to the returns delivered in on the 1ſt of November 1800, conſiſts of Loyal French Emigrants, Caſtries, Mortemart, Roll and Dillon; Meuron ditto; four ditto Dutch, each having a company of artillery attached, and one Dutch rifle with a company of pioneers; Lowenſtein's corps, which was not completed, and one corps of foreign invalids. Staff to a foreign hoſpital. There are beſides 16 unattached foreign officers who receive full pay, 166 ditto on half pay, 504 aged and wounded ditto, 46 foreign officers widows, 44 children of foreign officers who have died in the king's ſervice. There is alſo a ſmall corps of eſtafettes, which is attached to the waggon train, and conſiſts wholly of foreigners.

INFANTRY, *Heavy armed*, among the ancients, were ſuch as wore a complete ſuit of armour, and engaged with broad ſhields and long ſpears. They were the flower and ſtrength of the Grecian armies, and had the higheſt rank of military honour.

INFANTRY, *Light armed*, amongſt the ancients, were deſigned for ſkirmiſhes, and for fighting at a diſtance. Their weapons were arrows, darts or ſlings.

INFANTRY, *Light*, have only been in uſe ſince the year 1656. They have no camp equipage to carry, and their arms and accoutrements are much lighter than the common infantry, or battalion men. Wherever there is light cavalry, there ſhould be light infantry to act in conjunction.

INFARCTION, in *Medicine*, *infarctus*, ἔμφραξις of the Greeks, is ſynonymous with *obſtruction*, and *congeſtion*, and denotes that ſtate of any organ of the body, which is tumid, with the blood-veſſels loaded, and is more eſpecially applied to the tumours produced by a chronic inflammation of the parts.

INFARCTION *of the Liver*. See HEPATITIS, and LIVER, *Chronic Diſeaſes of*.

INFARCTION *of the Spleen*. See SPLENITIS and SPLEEN.

INFARCTION *of the Meſentery*. See MARASMUS, and TABES *Meſenterica*.

INFATUATE, to prepoſſeſs any one in favour of ſome perſon or thing that does not deſerve it, ſo far as that he cannot eaſily be diſabuſed.

The word *infatuate* comes from the Latin *fatuus*, *fool*, of *fari*, *to ſpeak out*; which is borrowed from the Greek φαω, whence φατης, which ſignifies the ſame with *vates* in Latin, or *prophet* in Engliſh: and the reaſon is, becauſe their prophets or prieſts uſed to be ſeized with a kind of madneſs or folly when they began to make their predictions, or deliver oracles.

The Romans called thoſe perſons infatuated, *infatuati*, who fancied they had ſeen viſions, or imagined the God Faunus, whom they called *Fatuus*, had appeared to them.

INFECTION, in *Medicine*, a word uſed in two acceptations: firſt as denoting the effluvium or infectious matter, exhaled from the perſon of one diſeaſed, and capable of communicating the diſeaſe to others who inhale it; in which ſenſe it is ſynonymous with *contagion*: and ſecondly, as ſignifying the act of communication of ſuch morbid effluvium, by which the diſeaſe is transferred. The word comes from the Latin verb *inficio*, which properly ſignifies to dye of ſome other colour, or to cauſe ſomething to be imbibed. See CONTAGION.

INFEODATION *of Tithes*, in *Law*. See TITHES.

INFERIÆ, in *Antiquity*, ſacrifices offered to the dii manes, or the ſouls of deceaſed heroes and illuſtrious perſons; or even of any relation or perſon whoſe memory was held in veneration.

INFERIOR, ſtands oppoſed to ſuperior.

INFERIOR *Courts of Record*, in *Engliſh Law-writers*, is uſed as a general name for corporation-courts, courts-leet, and ſheriffs-torns. See COURTS.

Moſt courts are ſubordinate to ſome other; but for diſtinction ſake the term inferior-court is by ſir Matthew Hale, and others, applied in the manner here mentioned.

INFERIOR *Maxilla*, *Ocean*, *Planet*. See the ſubſtantives.

INFERIOR *Penis*, in *Anatomy*, a name given by Spigelius to one of the muſcles of the penis, generally called the accelerator by the moderns; and by Veſalius, and others of his time, primus penis.

INFERIOR *Obliquus*, *Serratus*, *Subſcapularis*. See the ſeveral articles.

INFERIORIS *labii depreſſor*, *labii elevator*. See DEPRESSOR, and ELEVATOR.

INFERNAL GLASS, in *Chemiſtry*, is a name given to the bolt-head, when its ſtem is continued downward into the body of the glaſs veſſel, and left open only by a very ſmall orifice.

INFERNAL *Salt*, a name given by Hoffman, and ſome other of the chemical writers, to nitre; they have alſo called it *cerberus chemicus*.

INFERNAL *Stone*. See LAPIS *Infernalis*, CAUSTIC, and CRYSTALS *of Silver*.

INFERNALS, in *Artillery*, floating mines conſtructed in the bodies of ſhips or boats. The firſt inventor of them, or at leaſt the firſt who put them in practice, was Frederick Jambelli, an Italian engineer, at the ſiege of Antwerp by the Spaniards under Alexander, prince of Parma, in the year 1585. A very particular and intereſting relation of their wonderful effects is given by Strada, in his "Hiſtory of the

Belgic War." The great deſtruction made by theſe cauſed ſeveral others to be tried; but none of them ſucceeded. At Dunkirk and St. Maloes they were tried by the Engliſh; at Havre de Grace by the Engliſh and Dutch, under king William; and one was conſtructed by the French to be uſed againſt Algiers, in 1688, but it was not employed. St. Remi, in his Memoirs of Artillery, has given a ſection and view of the infernal uſed at St. Maloes. See a deſcription and figure of it in Groſe's Military Antiquities, v. i. p. 410.

INFERTILITY. See Fertility.

INFIBULATION, in *Antiquity*. It was a cuſtom among the Romans, to infibulate their ſinging boys, in order to preſerve their voices: for this operation, which prevented their retracting the prepuce over the glans, and is the very reverſe to circumciſion, kept them from injuring their voices by premature and prepoſterous venery: ſerving as a kind of padlock, if not to their inclinations, at leaſt to their abilities. It appears by ſome paſſages in Martial, that a leſs decent uſe was made of infibulation among the luxurious Romans: for ſome ladies of diſtinction, it ſeems, took this method of confining their paramours to their own embraces. Juvenal alſo hints at ſome ſuch practice. Celſus, a chaſte author, ſays, infibulation was ſometimes practiſed for the ſake of health; and nothing deſtroys it more than the ſilly practice this operation ſeems intended to prevent. This practice is not perhaps likely to be revived; if, however, any one who has ſuffered in his conſtitution by prepoſterous venery, ſhould be able to get children, and ſhould be inclined to prevent the ſame misfortune in them, by infibulation; the method of doing it is thus:

The ſkin which is above the glans is to be extended, and marked on both ſides with ink, where it is perforated, and then ſuffered to retract itſelf. If the marks recur upon the glans, too much of the ſkin has been taken up, and we muſt make the marks farther; if the glans remain free from them, they ſhew the proper place for affixing a fibula: then paſs a needle and thread through the ſkin where the marks are, and tie the threads together; taking care to move it every day, until the parts about the perforations are cicatriſed: this being effected take out the thread, and put in the fibula; which the tighter it is the better. Celſus, lib. vii. cap. 25.

Authors have not determined what the fibula of the ancient ſurgeons was, though no doubt they were for different purpoſes. In the preſent caſe, the fibula ſeems to mean a ring of metal, not unlike what the country people put through the noſes of ſwine.

INFIDEL, a term applied to ſuch perſons as are not baptized, and that do not believe the truths of the Chriſtian religion. See Deist.

INFIERNO, in *Geography*, one of the ſmaller Canary iſlands, between Lancerotta and St. Clara.

INFIESTO, a town of Spain, in the province of Aſturias; 20 miles E. of Oviedo.

INFILTRATION, in *Geology*, is one of the proceſſes of nature, by which ſtony hardneſs ſeems to have been given or increaſed in mineral ſubſtances or ſtrata, in certain ſituations, effected by the infiltration or ſoakage of water laden with ſtony particles, through porous ſubſtances, and then depoſiting their lapidiferous contents: Mr. Kirwan, in his "Geological Eſſays," pages 45, 128, 131, and 412, has conſidered this mode of indurating the terreſtrial ſtrata, and quoted a number of curious mineral changes and appearances aſcribed to this agent.

INFINITE, that which has neither beginning nor end: in which ſenſe God alone is infinite.

Infinite is alſo uſed to ſignify that which has had a beginning, but will have no end: as angels, and human ſouls.

This makes what the ſchoolmen call *infinitum a parte poſt*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end, but had no beginning. See Indefinite and Finite.

Infinite, in *Mathematics*, is applied to quantities which are either greater or ſmaller, than any aſſignable ones. In which ſenſe it differs not much from what we otherwiſe call *indefinite* or *indeterminate*. Thus, an

Infinite, or *Infinitely great line*, in *Geometry*, denotes only an indefinite or indeterminate line; to which no certain bounds or limits are preſcribed.

Infinite *Quantities*. Though the idea of magnitude infinitely great, or ſuch as exceeds any aſſignable quantity, does include a negation of limits; yet all ſuch magnitudes are not equal among themſelves; but beſides infinite length and infinite area, there are no leſs than three ſeveral ſorts of infinite ſolidity; all of which are quantities *ſui generis*; and thoſe of each ſpecies are in given proportions.

Infinite length, or a line infinitely long, is to be conſidered, either as beginning at a point, and ſo infinitely extended one way; or elſe both ways from the ſame point: in which caſe the one, which is a beginning of infinity, is one-half of the whole, which is the ſum of the beginning and ceaſing infinity, or infinity *a parte ante*, and *a parte poſt*, which is analogous to eternity in time or duration; in which there is always as much to follow, as is paſt any point or moment of time.

Nor does the addition or ſubtraction of time, length or ſpace of time, alter the caſe, either as to infinity or eternity; ſince neither the one nor the other can be any part of the whole.

As to infinite ſurface or area, any right line infinitely extended both ways on any infinite plane, divides that plane into equal parts, the one to the right, and the other to the left of the ſaid line; but if from any point in ſuch a plane, two right lines be infinitely extended, ſo as to make an angle; the infinite area, intercepted between theſe infinite right lines, is to the whole infinite plane, as the arc of a circle drawn on the point of concourſe of thoſe lines as a centre, intercepted between the ſaid lines, is to the circumference of the circle; or as the degrees of the angle to the 360 degrees of a circle.

For an example—Two infinite right lines meeting at a right angle on an infinite plane, do include a quarter part of the whole infinite area of ſuch a plane: if two parallel infinite lines be ſuppoſed drawn on ſuch an infinite plane, the area intercepted between them will be likewiſe infinite; but at the ſame time it will be infinitely leſs than the ſpace intercepted between two infinite lines, that are inclined, though with never ſo ſmall an angle, becauſe in the one caſe the given finite diſtance of the parallel lines diminiſhes the infinity in one degree of dimenſion; whereas in a ſector, there is infinity in both dimenſions; and conſequently the quantities are one infinitely greater than the other, and there is no proportion between them.

From the ſame conſideration ariſe three ſeveral ſpecies of infinite ſpace or ſolidity; for a parallelopiped, or a cylinder infinitely long, is greater than any finite magnitude, how great ſoever; all ſuch ſolids ſuppoſed to be formed on a given baſis, are in proportion to one another as thoſe baſes. But if two of thoſe three dimenſions are wanting, as in the ſpace intercepted between two parallel planes infinitely extended, and at a finite diſtance; or with infinite length and breadth, it have a finite thickneſs; all ſuch ſolids ſhall be as the given finite diſtances one to another.

But theſe quantities, though infinitely greater than the other, are yet infinitely leſs than any of thoſe wherein all the three dimenſions are infinite—Such are the ſpaces intercepted between two inclined planes infinitely extended: the ſpace intercepted by the ſurface of a cone, or the ſides of a pyramid, likewiſe infinitely continued, &c. all which, notwithſtanding the proportion of one to another, and to the το παν, or vaſt abyſs of infinite ſpace (wherein is the locus of all things that are, or can be) or to the ſolid of infinite length, breadth, and thickneſs (taken all manner of ways) are eaſily aſſignable—For the ſpace between two planes is to the whole, as the angle of thoſe planes to the 360 degrees of the circle. As for cones and pyramids, they are as the ſpherical ſurface intercepted by them, is to the ſurface of the ſphere; and therefore cones are as the verſed ſines of half their angles to the diameter of the circle; theſe three ſorts of infinite quantity are analogous to a line, ſurface, and ſolid; and like them, cannot be compared or have any proportion one to another.

INFINITES, *Arithmetic of.* See ARITHMETIC.

INFINITES, *Characters in Arithmetic of.* See CHARACTER.

INFINITE *Decimals.* See REPETEND.

INFINITE *Diſtreſs,* in *Law.* See DISTRESS.

INFINITE *Propoſition,* in *Logic.* See PROPOSITION.

INFINITE *Series.* See SERIES.

INFINITELY *ſmall quantity,* called alſo an *infiniteſimal,* is that which is ſo very minute, as to be incomparable to any finite quantity; or it is that which is leſs than any aſſignable quantity.

An infinite quantity cannot be either augmented or leſſened, by adding or taking from it any finite quantity; neither can a finite quantity be either augmented or leſſened, by adding to, or taking from it an infinitely ſmall quantity.

If there be four proportionals, and the firſt be infinitely greater than the ſecond; the third will be infinitely greater than the fourth.

If a finite quantity be divided by an infinitely ſmall one, the quotient will be an infinitely great one; and if a finite quantity be multiplied by an infinitely ſmall one, the product will be an infinitely ſmall one; if by an infinitely great one, the product will be a finite quantity.

If an infinitely ſmall quantity be multiplied into an infinitely great one, the product will be a finite quantity.

In the method of infiniteſimals, or of infinitely ſmall quantities, the element by which any quantity increaſes or decreaſes, is ſuppoſed to be infinitely ſmall, and is generally expreſſed by two or more terms; ſome of which are infinitely leſs than the reſt, which being neglected as of no importance, the remaining terms form what is called the difference of the propoſed quantity. The terms that are neglected in this manner, as infinitely leſs than the other terms of the element, are the very ſame which ariſe in conſequence of the acceleration, or retardation of the generating motion, during the infinitely ſmall time in which the element is generated; ſo that the remaining terms expreſs the element that would have been produced in that time, if the generating motion had continued uniform, as is farther explained under FLUXION.

Therefore thoſe differences are accurately in the ſame ratio to each other as the generating motions or fluxions. And hence, though infiniteſimal parts of the elements are neglected, the concluſions are accurately true, without even an infinitely ſmall error, and agree preciſely with thoſe that are deduced by the methods of fluxions. In order to render the application of this method eaſy, ſome analogous principles are admitted, as that the infinitely ſmall elements of a curve are right lines, or that a circle is a polygon of an infinite number of ſides, which being produced, give the tangents of a curve, and by their inclination to each other meaſure the curvature. This is as if we ſhould ſuppoſe that when the baſe flows uniformly, the ordinate flows with a motion which is uniform for every infinitely ſmall part of time; and increaſes, or decreaſes, by infinitely ſmall differences at the end of every ſuch time.

But however convenient this principle may be, it muſt be applied with caution and art, on various occaſions. It is uſual, therefore, in many caſes, to reſolve the element of the curve into two or more infinitely ſmall right lines; and ſometimes it is neceſſary (if we would avoid error) to reſolve it into an infinite number of ſuch right lines, which are infiniteſimals of the ſecond order. In general it is a *poſtulatum* in this method, that we may deſcend to infiniteſimals of any order whatever, as we find it neceſſary; by which means any error that might ariſe in the application of it may be diſcovered and corrected by a proper uſe of this method itſelf.

It is alſo to be obſerved, that when the value of a quantity that is required in a philoſophical problem becomes, in certain particular caſes, infinitely great or infinitely little, the ſolution would not be always juſt, though ſuch magnitudes were admitted. As when it is required, to find by what centripetal force a curve would be deſcribed about a fixed point that is either in a curve, or is ſo ſituated that a tangent may be drawn from it to the curve. The value of the force is found infinite at the centre of the forces in the former caſe, and at the point of contact in the latter; yet it is obvious, that an infinite force could not inflect the line deſcribed by a body that ſhould proceed from either of theſe points into a curve; becauſe the direction of its motion in either caſe paſſes through the centre of the forces, and no force, how great ſoever, that tends towards the centre, could cauſe it to change that direction. But it is to be obſerved, that the geometrical magnitude by which the force is meaſured, is no more imaginary in this than in other caſes, where it becomes infinite; and philoſophical problems have limitations that enter not always into the general ſolution given by geometry.

But although by proper care errors may be avoided in the method of infiniteſimals, yet it muſt be owned that to ſuch who have been accuſtomed to a more ſtrict and rigid kind of demonſtration in the elementary parts of geometry, it may not ſeem to be conſiſtent with perfect accuracy, that, in determining the firſt differences, any part of the element of the variable quantity ſhould be rejected, merely becauſe it is infinitely leſs than the reſt; and that the ſame part ſhould be afterwards employed for determining the ſecond and higher differences, and reſolving ſome of the moſt important problems. Nor can we ſuppoſe that their ſcruples will be removed, but rather confirmed, when they come to conſider what has been advanced by ſome of the moſt celebrated writers on this method, who have expreſſed their ſentiments concerning infinitely ſmall quantities in the preciſeſt terms; while ſome of them deny their reality, and conſider them only as incomparably leſs than infinite quantities, in the ſame manner as a grain of ſand is incomparably leſs than the whole earth; and others repreſent them in all their orders, as no leſs real than finite quantities. And although it appears, from what has been ſaid in this article, that a ſatisfactory account may be given for the brief way of reaſoning that is uſed in the method of infiniteſimals; while nothing is neglected without accounting for it; and then the harmony between the method of fluxions, and that of infiniteſimals thus appears more perfect.

And however ſafe and convenient this method may be, yet ſome will always ſcruple to admit infinitely little quantities and infinite orders of infiniteſimals, into a ſcience that boaſts of the moſt evident and accurate principles, as well as of the moſt rigid demonſtrations. It is therefore proper, that this extenſive and uſeful doctrine ſhould be eſtabliſhed on unexceptionable principles. See the articles FLUXION and LIMIT. See alſo Mr. Maclaurin's Treat. of Fluxions, in the Introduction, p. 39, 40, &c. and book i. art. 495 to 502.

INFINITELY *Infinite Fractions*, or all the powers of all the fractions whoſe numerator is one, are together equal to an unit. See the demonſtration hereof given by Dr. Wood, in Hook, Phil. Coll. N° 3. p. 45, ſeq.

Hence, it is deduced, 1°. That there are not only infinite progreſſions, or progreſſions *in infinitum;* but alſo infinitely farther than one kind of infinity. 2°. That the infinitely infinite progreſſions are notwithſtanding computable, and to be brought into one ſum; and that not one finite, but ſo ſmall as to be leſs than any aſſignable number. 3°. That of infinite quantities, ſome are equal, others unequal. 4°. That one infinite quantity may be equal to two, three, or more other quantities, whether infinite or finite.

INFINITIVE, in *Grammar*, the name of one of the moods, which ſerve for the conjugating of verbs.

The infinitive does not denote any preciſe time, nor does it determinate the number, or perſons, but expreſſes things in a looſe indefinite manner; as, *to teach*, &c.

Hence the Latin and modern grammarians have called verbs under this mode, from this their indefinite nature, infinitives. Sanctius has given them the name of imperſonals; and the Greeks that of ἀπαρεμφατα from the ſame reaſon of their not diſcovering either perſon or number.

Infinitives, ſays Mr. Harris, not only lay aſide the character of attributives, but they alſo aſſume that of ſubſtantives, and are diſtinguiſhed with their ſeveral attributes: *e. g.* "Dulce & decorum eſt pro patria *mori*; *ſcire* tuum nihil eſt, &c."

Hence the infinitive has been ſometimes called ονομα ῥηματικον, a verbal noun; ſometimes ονομα ῥηματος, the verb's noun. The reaſon of the appellation is evident in Greek, by its taking the prepoſitive articles before it in all caſes; thus το γραφειν, τȣ γραφειν, τω γραφειν. The ſame conſtruction is not unknown in Engliſh. Thus Spencer,

> "For not to have been dipped in Lethe's lake
> Could ſave the ſon of Thetis *from to die*:" i. e.

ἀπο τȣ θανειν.

The ſtoics held the infinitive as the genuine ῥημα, or verb, a name which they denied to all other modes; becauſe the true verbal character was conceived to be contained ſimple and unmixed in the infinitive only: thus, *to walk*, means ſimply that energy, and nothing more; the other modes, beſides expreſſing this energy, ſuperadd certain affections which reſpect perſons and circumſtances. The infinitive, ſays Priſcian, "ſignificat ipſam rem, quam continet verbum." The infinitive, in the application of it, naturally coaleſces with all thoſe verbs, that denote any tendency, deſire, or volition of the ſoul, but not readily with others. See Harris's Hermes, p. 163, &c.

In moſt languages, both ancient and modern, the infinitive is diſtinguiſhed by a termination peculiar to it; as τυπτειν in the Greek, *ſcribere* in the Latin, *ecrire* in the French, *ſcrivere* in the Italian, &c. but the Engliſh is defective in this point; ſo that to denote the infinitive, we are obliged to have recourſe to the article *to*: excepting ſometimes when two or more infinitives follow each other.

The practice of uſing a number of infinitives ſucceſſively, is a great but a common fault in language; as *he offered to go to teach to write* Engliſh.—Indeed, where the infinitives have no dependence on each other, they may be uſed elegantly enough; as *to mourn, to ſigh, to ſink, to ſwoon, to die.*

INFINITO, in the *Italian Muſic*, is uſed for ſuch canons or fugues, as may be begun again and again: whence they are alſo called *perpetual fugues.* See FUGUE.

INFINITY, the quality which denominates a thing infinite. The idea ſignified by the name infinity is beſt examined by conſidering to what things infinity is by the mind attributed, and how the idea itſelf is framed: finite and infinite are looked upon as the modes of quantity, and are attributed primarily to things that have parts, and are capable of increaſe or diminution, by the addition or ſubtraction of any the leaſt part. Such are the ideas of ſpace, duration, and number. When we apply this idea to the Supreme Being, we do it primarily in reſpect of his duration and ubiquity: and more figuratively, when to his wiſdom, power, goodneſs, and other atttibutes, which are properly inexhauſtible and incomprehenſible: for when we call them infinite, we have no other idea of this infinity but what carries with it ſome reflection on the number, or the extent of the acts or objects of God's power and wiſdom, which can never be ſuppoſed ſo great, or ſo many, that theſe attributes will not always ſurmount and exceed, though we multiply them in our thoughts with the infinity of endleſs number. We do not pretend to ſay, how theſe attributes are in God, who is infinitely beyond the reach of our narrow capacities: but this is our way of conceiving them, and theſe are our ideas of their infinity.

We come by the idea of infinity thus: every one that has any idea of any ſtated length or ſpace, as a foot, yard, &c. finds that he can repeat that idea, and join it to another, to a third, and ſo on, without ever coming to an end of his additions. From this power of enlarging his idea of ſpace, he takes the idea of infinite ſpace, or immenſity. By the ſame power of repeating the idea of any length or duration we have in our minds, with all the endleſs addition of number, we alſo come by the idea of eternity.

If our idea of infinity be got by repeating without end our own ideas, it may be aſked, why do we not attribute it to other ideas, as well as thoſe of ſpace and duration; ſince they may be as eaſily, and as often repeated in our minds, as the other? yet nobody ever thinks of infinite ſweetneſs, or whiteneſs, though he can repeat the idea of ſweet or white, as frequently as thoſe of yard or day? To this it is anſwered, that thoſe ideas which have parts, and are capable of increaſe by the addition of any parts, afford us by their repetition an idea of infinity; becauſe with the endleſs repetition there is connected an enlargement, of which there is no end: but it is not ſo in other ideas; for if to the moſt perfect idea I have of white, I add another of equal whiteneſs, it enlarges not my idea at all. Thoſe ideas, which conſiſt not of parts, cannot be augmented to what proportion men pleaſe, or be ſtretched beyond what they have received by their ſenſes; but ſpace, duration, and number, being capable of increaſe by repetition, leave in the mind an idea of an endleſs room for more; and ſo thoſe ideas alone lead the mind towards the thought of infinity.

We are carefully to diſtinguiſh between the idea of the infinity of ſpace, and the idea of the ſpace infinite. The firſt is nothing but a ſuppoſed endleſs progreſſion of the mind over any repeated idea of ſpace; but to have actually in the mind the idea of ſpace infinite,—is to ſuppoſe the mind already paſſed over all thoſe repeated ideas of ſpace, which an endleſs repetition can never totally repreſent to it; which carries in it a plain contradiction. See SPACE.

This will be plainer, if we conſider infinity in numbers: the infinity of numbers, to the end of whoſe addition every one perceives there is no approach, eaſily appears to any one that reflects on it: but how clear ſoever this idea of the infinity of numbers be, there is nothing yet more evident than the abſurdity of the idea of an actual infinite number. Locke's Eſſay, vol. i. chap. xvii.

INFINITY *of Actions*, in *Law*; the lord of the ſoil may have a ſpecial action againſt him who ſhall dig ſoil in the king's highway: but one ſubject may not have his action againſt another for common nuiſances; for if he might, then every man might have it, and ſo the actions would be infinite, &c. 1 Co. Inſt. 56. 9 Rep. 113.

INFIRMARY, a place where the ſick and weak belonging to any ſociety, or community, are diſpoſed, either for nurſing or cure. See HOSPITAL.

INFLAMMABILITY, is that property of bodies which diſpoſes them to kindle, or catch fire. See FLAME, HEAT, and PHLOGISTON.

INFLAMMABILITY *of Oils*. See OIL.

INFLAMMABLE AIR. See HYDROGEN.

INFLAMMABLE *Springs*. About the middle of the laſt century, a ſpring or well at Broſely in Shropſhire, was much noticed on account of the inflammable exhalations or gaſſes which it emitted, ſo that when a cover was adapted to it, that contracted the ſtream of air, and a candle was applied, it continued to burn with a lambent blue flame for a long time: but the coal-works in the neighbourhood have long ſince drained this well. During the driving of Stoke ſough, to drain the lead mines near Eyam in Derbyſhire, ſuch a quantity of liquid bitumen or rock oil was liberated from the ſmall cavities in the limeſtone, and from geodes of limeſtone in the ſhale above it, that it frequently ſwam on the water in the ſough, in ſufficient quantities to take fire and burn for a time, after the application of a lighted candle: this was called by Mr. Bray, in his "Tour" (p. 176.) a burning ſpring, but improperly, ſeeing that the bitumen was only ſet free by the tools of the workmen, and was not ſpontaneouſly diſcharged from the rock, a condition which ſeems eſſential to a ſpring of any kind. See an account of this ſough, in Mr. Farey's Report on Derbyſhire, vol. i. p. 330.

INFLAMMATION is concerned, either as a cauſe, ſymptom, conſequence, or complication of the greater number of diſeaſes, to which the human body is liable, and hence it has always been conſidered by the moſt enlightened pathologiſts as a ſubject which, in point of importance, is inferior to none in the whole circle of medical ſcience. It intereſts the phyſician, the ſurgeon, the accoucheur, and, in ſhort, every individual, who is in the habit of being entruſted with the treatment of any kind of diſorder, or accidental injury. A knowledge of the nature and laws of inflammation, and juſt ideas reſpecting the means of checking and curing this affection, may be ſaid to conſtitute a key, or introduction, to the comprehenſion of diſeaſes in general; for ſome may be alleged to conſiſt of it, and very few are entirely unattended with it in one ſtage or another. It is for ſuch reaſons, that ſyſtematic authors moſtly treat of it at the very beginning of their works.

The term inflammation, which is derived from the Latin word *inflammatio*, probably owes its origin to an ancient opinion, that there was fire in the part affected, and, if we advert to the conſiderable ſenſation of heat, which the patient experiences in the ſeat of the complaint, the uſe of ſuch an expreſſion ſeems almoſt natural. The Greeks appear to have employed terms of ſimilar import, as φλεγμονη, or φλογωσίς, from φλεγω, *I burn.*

Inflammation is diviſible into ſeveral ſpecies. The diſtinctions chiefly inſiſted upon by ſurgical writers, are the *acute* and *chronic*. When inflammation is unattended with any particular diſeaſe, it is ſometimes called *ſimple* or *healthy*, of which there can only be one kind. But the *morbid* inflammations, or ſuch as are influenced by the preſence of a diſeaſed action, are as numerous and various as diſeaſes themſelves, each diſeaſe, in fact, having its own ſpecific kind of inflammation; as, for inſtance, the ſmall-pox puſtule, the cow-pox veſicle, the carbuncle, eryſipelas, ſcrofula, the venereal diſeaſe, &c.

When common inflammation is ſpoken of, the acute healthy ſpecies is uſually implied, or that which is ſo well known by the name of *phlegmon*. It is attended with four remarkable ſymptoms in the part affected, namely, pain, redneſs, ſwelling and heat: "notæ vero inflammationis ſunt quatuor; rubor et tumor, cum calore et dolore." Celſus, lib. iii. cap. 10.

The pain which accompanies the various ſorts of inflammation, differs very materially both in its degree and kind. In many inſtances, indeed, it might be more proper to ſay, that there is an alteration in the natural ſenſations and ſenſibility of the part, than that there is pain, which latter term leads one to underſtand a degree of agony. Numerous chronic inflammations produce very trivial uneaſineſs in the part, the patient feeling, perhaps in the ſeat of the diſeaſe, merely a ſenſation of weight and heavineſs. It is likewiſe remarked by Richerand, that the pruritus, which precedes and attends certain cutaneous eruptions, ſo far from being painful, occaſions rather an agreeable ſenſation. It is only when the ſenſibility is carried beyond a particular pitch that it amounts to pain. In phlegmonous inflammation the pain is of a throbbing deſcription, and the ſuffering is joined with an annoying ſenſe of weight. In eryſipelas the pain is of a burning kind. In anthrax it is accompanied by a feeling of ſtiffneſs. The ſeverity of the pain is generally in proportion to the vehemence of the inflammation, the ſenſibility of the parts, and the reſiſtance which their ſtructure makes to the tumefaction.

It is a curious fact, of which the practice of ſurgery affords many proofs, that parts which, in their natural healthy ſtate, are not remarkable for their great ſenſibility, are frequently affected when inflamed with an exquiſite degree of tenderneſs and pain. The gums, in the ſound ſtate, are not very ſenſible; they may be divided with a lancet, without any great deal of pain being occaſioned: and the preſſure of hard ſubſtances againſt them in maſtication is not productive of injury. When inflamed, however, in conſequence of decayed teeth, a cold, or any other cauſe, they are affected with extreme ſenſibility, ſwell in a conſiderable degree, and cannot be touched, or preſſed, in the ſlighteſt manner, without much ſuffering being excited. The ligaments are naturally almoſt devoid of ſenſation; but, in ſeveral diſeaſes of the joints, they are even much more painful, than ſome other inflamed parts, which, when ſound, poſſeſs a vaſt deal of ſenſibility.

A preceding remark, therefore, that the pain is in proportion to the natural ſenſibility of the parts affected, is not to be received without exceptions. With reſpect to the immediate way, in which pain is excited in caſes of inflammation, it ſeems moſt rational to impute the degree of ſuffering to the augmented ſenſibility of the nerves, and the unnatural condition in which they are placed. In chronic inflammation, the changes which the parts undergo are ſlow, and the nerves ſeem to have time to adapt themſelves to the alteration;

tion; but in acute inflammation, the mutations are quick, and the pain is, for the moſt part, conſiderable.

The ſwelling appears to be occaſioned by ſeveral circumſtances, yet principally by the increaſed determination of blood to the veſſels of the part, and by an effuſion of coagulating lymph in the interſtices of the cellular ſubſtance. The dilatation of the blood-veſſels, and the interruption of abſorption, probably have alſo a ſhare in producing the effect.

The conſiderable injection of the ſmall veſſels with red blood, and their great increaſe of diameter, afford ſome explanation of the manner in which the preternatural redneſs ariſes. It has been a prevailing ſentiment, that the redneſs of common inflammation is partly owing, not merely to a dilatation, but at the ſame time to an actual increaſe in the number of the blood-veſſels of the inflamed part. New veſſels are ſuppoſed to be generated. This doctrine, however, is far from reſting upon unqueſtionable evidence. When coagulating lymph is extravaſated upon the ſurface of a wound, an inflamed membrane, &c. it is beyond a doubt often rendered vaſcular, or, in other words, becomes furniſhed with new veſſels. But, in the extravaſated lymph of a phlegmonous tumour, we have no evidence to prove that there is any generation of new veſſels. If the veſſels have the appearance of being more numerous, it is becauſe their diameters are enlarged, and many, which previouſly contained only a colourleſs fluid, are now filled with viſibly red blood. Were the extravaſated lymph of a phlegmonous ſwelling to be rendered organized and vaſcular, the tumefaction and redneſs would probably be more permanent, and not admit (at leaſt ſo eaſily as they often do) of reſolution. When adheſions form between two inflamed ſurfaces, the organized ſubſtance, forming the connection, lives after the ſubſidence of the inflammation, and is a permanent effect. (Dict. of Pract. Surgery.) According to Mr. Burns, the ſuppoſition eaſily admits of refutation; for heat, and many other cauſes of inflammation, operate ſo quickly, that there can be no time for the formation of any new veſſels; and yet the redneſs is as great, and the inflammation as perfect, in a minute, as in an hour, or a day, after the application of the exciting cauſe. (Diſſert. on Inflammation). Now that we are noticing the redneſs of inflamed parts, it may be as well to mention the circumſtance of red blood itſelf being ſometimes extravaſated, in conſequence of inflammation. The occurrence generally indicates, that the inflammatory miſchief has been rapid and violent. The moſt ſtriking inſtances, which juſt now preſent themſelves to our mind, are, firſt, that ſtate of an inflamed eye, termed *chemoſis*, for an account of which we refer to OPHTHALMY; and, ſecondly, the ſpots, produced by effuſed blood, on the inner coat of the ſtomach, when this viſcus has been inflamed, in conſequence of poiſon. There is ſtill another circumſtance, which has been mentioned by the celebrated Mr. John Hunter, as conducive to the red appearance of inflamed parts, *viz.* the blood, after it has become venous, retaining a certain degree of the bright ſcarlet colour, which it poſſeſſed in the arteries. We cannot offer any opinion concerning the truth of the latter ſuggeſtion; as coming from Mr. Hunter, it cannot fail to deſerve attention.

The experiments which Mr. Hunter made with the thermometer, tend to evince, that the real augmentation of the heat of an inflamed part is inconſiderable, although it ſeems to be very great, when a judgment is derived from the patient's feelings. If we recollect, that the ſenſibility of the nerves is augmented, we can no longer be ſurprized, that they ſhould convey to the ſenſorium falſe impreſſions. With regard to the manner, in which the increaſed temperature of inflamed parts is produced, this ſubject is explicable on the principles, which apply to the production of animal heat in general. We ſhall merely obſerve, that there is always a greater determination of blood to a part which is in a ſtate of inflammation, than to the ſame part when it is not inflamed. The blood flows through it with augmented velocity, and we always find, that the heat of the whole body, as well as of any portion of it, is always in a ratio to the accelerated ſtate of the circulation. When a perſon runs, he hurries the current of the entire maſs of blood, and his whole body is thrown into a heated ſtate. In fevers, the circulation is quickened, and there is likewiſe general heat. But in inflammation unattended with febrile diſorder, the blood flows only through the inflamed part with increaſed impetuoſity, and, of courſe, the augmentation of heat is local and circumſcribed.

Phlegmon, or what may be called common inflammation, has been regarded by many writers as an affection of the cellular membrane. Its frequent occurrence in every ſituation, both internal and external, has been accounted for by the way, in which the cellular ſubſtance pervades the texture of almoſt every part of the body. Phlegmon is repreſented as being attended with more ſwelling than any other ſpecies of inflammation. The bright red colour in the centre of the tumour gradually extends towards the circumference, and is inſenſibly loſt on the ſurrounding ſkin. The ſwelling, on the other hand, is diſtinctly circumſcribed. The heat has been compared with that ariſing from the ſteam of boiling water. The throbbing, to which we have already adverted, manifeſtly depends upon the pulſation of the arteries, and is ſynchronous with the pulſe of the whole ſyſtem. The throbbing particularly affects the patient himſelf, and the ſurgeon may plainly perceive it when he touches the part, all the ſmall veſſels of which are dilated, and beat in a preternatural degree. In a common whitlow, this vehement throbbing is not confined to the finger, but extends to the large arteries, a conſiderable way up the arm.

The active mind of the late Mr. John Hunter led him to pay much attention to the intereſting ſubject before us, and from him we have many fertile and original obſervations. The principles and laws of inflammation were better explained by this philoſophical obſerver, than by any of his profeſſional predeceſſors. He has noticed the well eſtabliſhed circumſtance, attending phlegmonous and other inflammations, whereſoever ſituated, namely, their being always moſt violent on the ſide next to the external ſurface of the body. Thus, when inflammation invades the ſocket of a tooth, it chiefly takes place towards the cheek, and not on the inſide of the alveolary proceſs. He points out, that the ſituation, poſition, ſtructure, functions, and diſtance of the part affected from the ſource of the circulation, cauſe conſiderable variety in the progreſs and termination of all inflammation. He maintains, that parts, naturally enjoying a vigorous circulation of blood then can bear inflammation better than others in the oppoſite condition. From this obſervation, however, he excepts vital parts, which, though they may be exceedingly vaſcular, do not undergo inflammation favourably, becauſe the natural operations of univerſal health depend ſo much upon the ſoundneſs of ſuch organs. Mr. Hunter alſo endeavours to ſhew, that the depending poſition of a part ſeems to have a bad effect on inflammation, probably by retarding the return of the blood. It is one of the ſame author's principles, that new-formed parts, as many tumours and excreſcences, callus, ſcars, &c. poſſeſs leſs vitality than is the ſhare of other parts, which conſtitute a portion of the original fabric of the body: hence, when inflamed, they are exceedingly apt to be deſtroyed by ulceration, or mortification.

When an inflammation is of trivial extent, and not ſeriouſly painful, the effects of the complaint are altogether local. In the contrary caſe, the whole circulation partakes in the excitement, and the inflammatory fever occurs.

The blood, taken from a patient labouring under inflammation, is well known by all medical practitioners to exhibit peculiar appearances. The blood, when it has eſcaped out of the living veſſels, ſpontaneouſly ſeparates into two diſtinct parts, the ſerum and the craſſamentum. The laſt is a compound ſubſtance, conſiſting chiefly of coagulating lymph and red globules, the moſt heavy ingredients in the blood. Now, it is to be obſerved, that blood, taken away from perſons affected with inflammation, is longer in coagulating, and coagulates more firmly, than when drawn from people in other circumſtances. Hence the red globules, which are very heavy, not being ſo ſoon entangled in the lymph, deſcend by their gravity more deeply from its ſurface, which, being in this manner more or leſs diveſted of the red colouring matter, is, from its appearance, termed the *buffy coat*, or *inflammatory cruſt*. The firmer and more compact coagulation of the lymph compreſſes out an unuſual quantity of ſerum from it, and the ſurface of the *ſizy* blood, as it is frequently called, is often formed into a hollow, the edges being drawn inwards. Theſe changes in the blood are, in ſome caſes, a more infallible proof of the exiſtence of inflammation than the pulſe itſelf. At the ſame time, it is probably only a criterion of ſome unuſual operation going on in the ſyſtem; for the blood, taken away from pregnant women, is always found to exhibit the above appearances, a circumſtance which ſhould always be recollected. In peritoneal inflammation, the patient ſometimes ſeems to be in the moſt feeble ſtate, and the pulſe, abſtractedly conſidered, would rather induce the practitioner to employ tonics and ſtimulants, than evacuations; but ſhould the continuance, or exaſperation of the diſorder, or any other reaſon, lead the ſurgeon to uſe the lancet, then the *buffy coat*, the *concave ſurface* of the blood, and the *large quantity of ſerum*, clear away all doubt concerning the exiſtence of inflammation. But every practitioner ought to bear in his mind, that, beſides pregnant women, there are a few anomalous conſtitutions met with, where the blood, taken away by the lancet, always exhibits the foregoing peculiarities, though inflammation may not prevail.

We ſee three very remarkable effects follow the prevalence of inflammation; *viz*. adheſions of parts of the body to each other; the formation of pus, or ſuppuration; and ulceration, a proceſs in which the lymphatics are more concerned than the blood-veſſels. Hence Mr. Hunter termed the different ſtages of inflammation the *adheſive*, the *ſuppurative*, and the *ulcerative*.

All parts of the body are not equally liable to each of the preceding conſequences. It was remarked by Mr. Hunter, that in the cellular membrane, and in the circumſcribed cavities, the adheſive ſtage takes place more readily than the others; ſuppuration may be ſaid to follow next in order of frequency; and, laſtly, ulceration. Whenever mucous membranes are affected, the ſuppurative inflammation comes on more readily, than either the adheſive or the ulcerative. Here adheſions, which originate from the ſlighteſt degree of inflammation in other ſituations and ſtructures, can only be produced by the moſt violent kind. Indeed, ulceration is much more frequently met with upon mucous ſurfaces than adheſions. The cellular membrane appears to be much more ſuſceptible of the adheſive inflammation than the adipoſe, and much more readily paſſes into the ſuppurative. Thus, we ſee the cellular ſubſtance, connecting the muſcles together, and the adipoſe membrane to the muſcles, inflaming and ſuppurating, and the matter ſeparating the muſcles from their lateral connections, and even the fat from the muſcles, while the adipoſe ſubſtance and the ſkin are only highly inflamed. Yet, it muſt be allowed, that in ſituations where fat abounds, we very frequently meet with abſceſſes. This is ſo much the caſe, that Mr. Bromfield accounted the fat a more common nidus for collections of matter, than the cellular ſubſtance itſelf. Thus abſceſſes about the anus, mammæ, &c. are remarkably frequent. When we ſpeak of the fat inflaming and ſuppurating, we ſhould rather ſay, that the membranous cavities containing this ſecretion are ſo affected; for, fat itſelf has no veſſels, principle of life, nor action of its own, and, conſequently, cannot be ſuppoſed to be capable of undergoing inflammation and ſuppuration.

Parts of the body, which lie deeply from the ſurface, but more particularly ſuch as are known by the name of vital, are readily affected with the adheſive inflammation. That they are not ſo much diſpoſed to ſuppurate as the ſuperficial parts are, is ſtrikingly illuſtrated in caſes of extraneous bodies, which, if deeply lodged, only produce the adheſive inflammation. By this proceſs a cyſt is formed, in which the foreign body lies, without much inconvenience to the patient, and may even change its ſituation, without ſeriouſly diſturbing the parts through which it paſſes. But no ſooner does it approach the ſkin, than abſceſſes immediately ariſe.

Much might be ſaid concerning the difference of the pulſe in the various caſes of inflammation. Thus, when any part of the ſurface of the body is affected with a certain degree of phlegmonous inflammation, the pulſe is generally full, frequent, and ſtrong. When the peritoneum and bowels are inflamed, it is very quick and ſmall, &c. We ſhall not, however, enlarge upon this topic, as the ſtate of the pulſe, in the ſeveral caſes, will be noticed in the many articles of this work appropriated to the conſideration of inflammatory diſeaſes.

According to Mr. Hunter, the ſuſceptibility of the body for inflammation is of two kinds; the one *original*, conſtituting a part of the animal economy, and beyond the reach of human inveſtigation; the other *acquired* from the influence of climate, habits of life, and ſtate of the mind over the conſtitution. The firſt kind of ſuſceptibility, being innate, cannot be diminiſhed by art; the ſecond may be leſſened by the mere avoidance of the particular cauſes upon which it depends. Theſe latter might be named *prediſpoſing*.

With regard to the *remote*, *exciting*, or *occaſional* cauſes of inflammation, they are infinite in number; but very eaſy of comprehenſion, becauſe moſt of them are referrible to two general claſſes. The firſt includes all ſuch as operate, by their ſtimulant or chemical qualities, as, for inſtance, heat, cantharides, ſulphuric acid, aqua ammoniæ puræ, &c. The ſecond embraces ſuch as act mechanically, as bruiſes, wounds, fractures, &c.

The principle on which cold becomes an exciting cauſe of inflammation, is yet conteſted among ſurgical writers, and may ſtill be conſidered as not decidedly known.

Fevers would ſometimes appear to be the exciting cauſes of inflammation. The local affection, thus originating, is often called *critical*, and is ſuppoſed by many to be the means, by which a ſtop is put to the conſtitutional indiſpoſition. Strong injunctions are, therefore, given not to repreſs an inflammation of this kind, leſt the method ſhould be productive of ſome worſe and even fatal diſorder. We have always conſidered this mode of reaſoning unſatisfactory, and ſhould have little apprehenſion of any real evils, which might ariſe from the attempt to diminiſh an inflammation, that appears as a conſequence of a fever.

The following obſervations reſpecting the proximate cauſe of inflammation, are taken from Mr. S. Cooper's Dictionary of Practical Surgery.

Numerous opinions have been entertained upon this ſubject; but almoſt every theory has been built upon the ſuppoſition of there being ſome kind of obſtruction in the inflamed part.

While the circulation of the blood was unknown, and the hypothetical notions of the power of the liver, in preparing and ſending forth this fluid continued to prevail, it is not aſtoniſhing, that the theories of phyſic ſhould be exceedingly imperfect. So fully perſuaded were phyſicians of the exiſtence and influence of different humours and ſpirits, and ſo little did they know of the regular and conſtant motion of the blood, that they believed in the poſſibility of depoſitions and congeſtions of the blood, the bile, or lymph; and acknowledged theſe as the cauſe of inflammation. Their anatomiſts taught them, and their profeſſors of phyſic ſupported the opinion, that the liver was the centre of the vaſcular ſyſtem, from which the blood went forth by day to the extremities, and returned again by night. If then any peccant matter irritated the liver, the blood was ſent out more forcibly; and if, at the ſame time, any part of the body were weakened, or otherwiſe diſpoſed to receive a greater quantity of fluid than the reſt, then a ſwelling was produced by the flow of humours to this place. Fluxions, or flows of humour to a place, might happen either from weakneſs of the part which allowed the humours to enter more abundantly, or from the place attracting the humours, in conſequence of the application of heat or other agents.

The peculiar nature of the ſwelling thus occaſioned was ſuppoſed, by the ancients, to depend upon the kind of humour. Blood produced the true phlegmon, bile, eryſipelas, &c.

The ancient phyſicians alſo entertained an idea, that the blood and humours might ſlowly ſtagnate in a part, from a want of expulſive power, and this affection was termed a *congeſtion*, while the expreſſion *fluxion* or *defluxion* was uſed to denote any ſwelling ariſing from the ſudden flow of humours from a diſtant part. The firſt was formed gradually without much pain, or the feeling of pulſation, and ran its courſe ſlowly; the ſecond appeared ſuddenly, was very painful, had a pulſatory feel, and was rapid in its progreſs. The ancients, who ſuppoſed that the blood had very little motion, and that its courſe could be eaſily directed or changed, recommended bleeding from ſome part which was remote from a recent inflammation, by which they imagined that the current of blood was altered, and a *revulſion* made. A revulſion was alſo made by raiſing a tumour in ſome other part, by means of ligatures, cupping-glaſſes, &c. or by giving nature an opportunity of diſcharging the humours from diſtant parts, by applying leeches or bliſters. Hence ſinapiſms were applied to the feet in diſeaſes of the ſuperior parts.

When blood was drawn from the vicinity of the fluxion, or congeſtion, the mode was called *derivation*, which only differed from *revulſion* in the diſtance to which the humour was drawn being leſs.

We ſhall not enter further into an account of the practice of the ancients in the treatment of inflammation; but ſhall refer the reader to what Mr. Burns has written on the ſubject. Our preſent object is only to trace the leading doctrines which have at different times prevailed, reſpecting the proximate cauſe of inflammation.

From the theories of *fluxion* and *congeſtion*, which were quite incompatible with the laws of the circulation of the blood, we turn our attention to the doctrine of *obſtruction*.

Boerhaave inculcated, (Aph. 375 et ſeq.) that inflammation was cauſed by an obſtruction to the free circulation of the blood in the minute veſſels, and this obſtruction, he ſuppoſed, might be cauſed by heat, diarrhœa, too copious flow of urine and ſweat, or whatever could diſſipate the thinner parts of the blood and produce a thickneſs or viſcidity of that fluid. When the lentor did not exiſt before the production of inflammation, he imagined, that the larger globules of the blood got into the ſmall veſſels, and thus plugged them up. When, for inſtance, the perſpiration was ſtopped, the fluid, being retained, dilated the veſſels, and allowed ſome of theſe miſchievous globules to enter, and produce a more permanent obſtruction. This circumſtance was termed an *error loci*, and was one of the chief cauſes aſſigned for inflammation. The obſtruction, whether cauſed by *viſcidity* or an *error loci*, was imagined to occaſion a reſiſtance to the circulation in the part affected; hence increaſed it in the other veſſels, proving an irritation to the heart, and augmenting the force or attraction of the blood in that part of the veſſel which was behind the obſtruction. This cauſed heat and pain, while the accumulation of the blood produced redneſs; which three ſymptoms are the eſſence of the diſeaſe. Beſides *obſtruction*, Boerhaave alſo brought into the account an *acrimonious ſtate of the fluids*, which rendered reſolution out of the queſtion, and gangrene likely to follow. Aph. 388.

The viſcidity of the blood cannot be admitted as the proximate cauſe of inflammation; becauſe we have no proof that this ſtate ever exiſts; or, granting that it did, it would not explain the phenomena. Were a viſcidity to occur, it would exiſt in the whole maſs of blood, would affect every part of the body alike, and could not be ſuppoſed to produce only a local diſorder. How alſo could ſuch a lentor be produced by cauſes which bring on inflammation ſuddenly, without there being time for changes of the fluids to take place?

With regard to the doctrine of *error loci*, or of red globules going into veſſels, which did not formerly tranſmit them, the fact muſt be admitted, at the ſame time, that the concluſion is denied. When the eye becomes inflamed, the tunica conjunctiva is ſeen with its veſſels full of red blood, which in health is not the caſe; but this redneſs never appears until the inflammation has commenced; and muſt, therefore, be conſidered as an effect, not a cauſe. Nor can this error loci occaſion any obſtruction in theſe veſſels; for if they be divided, the blood flows freely, which ſhews, that they are large enough to allow an eaſy circulation.

Boerhaave's theory of obſtruction was too circumſcribed, and too mechanical; it reduced all inflammations to one ſpecies. The only diſtinctions which could have ariſen, muſt have proceeded from the nature of the obſtruction itſelf. This doctrine could never account for the action of many ſpecific diſeaſes and morbid poiſons.

As for the ſuppoſition of the co-operation of an *acrimony of the fluids*, the proportion of the ſaline matter of the blood has never been proved to be greater in this, than in any other ſtate of the body. Even were a general diſorder of this kind to be admitted, no rational explanation of the proximate cauſe of local inflammation could be deduced from it.

Dr. Cullen attributed the proximate cauſe of inflammation to a "ſpaſm of the extreme arteries ſupporting an increaſed action in the courſe of them." This theory only differs from that of Boerhaave in the cauſe which is aſſigned for the obſtruction. Some cauſes of inequality in the diſtribution of the blood, may throw an unuſual quantity of it upon particular veſſels, to which it muſt neceſſarily prove a ſtimulus. But, farther, it is probable that, to relieve the congeſtion, the vis medicatrix naturæ increaſes ſtill more the action of the veſſels; and which, as in all other febrile diſeaſes, it affects, by the formation of a ſpaſm on their extremities. "A ſpaſm of the extreme arteries, ſupporting an increaſed action in the courſe of them, may, therefore, be conſidered as the proximate cauſe of inflammation; at leaſt, in all caſes not ariſing from direct ſtimuli applied; and even in this caſe, the ſtimuli may be ſuppoſed to produce a ſpaſm of the extreme veſſels."

The inconſiſtencies in Cullen's theory are very glaring. The congeſtion or accumulation of blood, which is only an effect or conſequence of inflammation, is ſet down as the cauſe of the ſpaſm of the veſſels, to which ſpaſmodic conſtrictions Cullen, ſtrangely enough, aſſigns the name of proximate cauſe. The ſpaſmodic contraction of the extremities of the veſſels, inſtead of propelling the accumulated quantity of blood, would render the paſſage of the blood from the arterial into the venous ſyſtem ſtill more difficult. Spaſmodic conſtriction of the ſmall veſſels is ſo far from being a ſatisfactory explanation of the proximate cauſe of inflammation, that even tying a large veſſel does not of itſelf bring on the affection. Phlegmon is alſo attended with an effuſion into the cellular ſubſtance from the extremities of the arteries; a circumſtance not eaſily explained upon the principle of obſtructed circulation. See Burns on Inflammation.

We ſhall now notice the celebrated, and very original opinions promulgated on this ſubject by the famous John Hunter. According to him inflammation is to be conſidered only as a diſturbed ſtate of parts, which requires a new, but ſalutary mode of action, to reſtore them to that ſtate, wherein a natural mode of action alone is neceſſary. From ſuch a view of the ſubject, therefore, inflammation, in itſelf, is not to be conſidered as a diſeaſe, but as a ſalutary operation, conſequent either to ſome violence, or ſome diſeaſe. Elſewhere, the author remarks, the act of inflammation is to be conſidered as an increaſed action of the veſſels, which, at firſt, conſiſts ſimply in an increaſe or diſtention beyond their natural ſize. This increaſe ſeems to depend upon a diminution of the muſcular power of the veſſels, at the ſame time that the elaſtic power of the artery muſt be dilated in the ſame proportion. This is, therefore, ſomething more than ſimply a common relaxation; we muſt ſuppoſe it an action in the parts to produce an increaſe of ſize, to anſwer particular purpoſes, and this Mr. Hunter would call an act of dilatation. The whole is to be conſidered as a neceſſary operation of nature. Owing to this dilatation, there is a greater quantity of blood circulating in the part, which is according to the common rules of the animal economy; for, whenever a part has more to do than ſimply to ſupport itſelf, the blood is there collected in larger quantity. The ſwelling is produced by an extravaſation of coagulable lymph, with ſome ſerum; but this lymph differs from the common lymph, in conſequence of paſſing through inflamed veſſels. It is this lymph which becomes the uniting medium of inflamed parts; veſſels ſhoot into it, and it has even the power of becoming vaſcular itſelf. The pain proceeds from ſpaſm. The redneſs is produced either by the arteries being more dilated than the veins, or becauſe the blood is not changed in the veins. When, after an injury, a part cannot be reſtored to health by inflammation alone, or by adheſion, then ſuppuration, as a preparatory ſtep to the formation of granulations, and the conſequent reſtoration of the part, takes place. The veſſels are nearly in the ſame ſtate as in inflammation; but they are more quieſcent, and have acquired a new mode of action. See Hunter on the Blood, Inflammation, &c.

An increaſed action of the veſſels is now almoſt univerſally regarded as the proximate cauſe of inflammation. This opinion derives ſtrong ſupport from a review of the ſeveral exciting cauſes of the affection, which, being in general of an irritating nature, muſt, when applied to living or ſenſible parts, occaſion a preternatural exertion of their veſſels. The method of cure tends alſo to confirm the common ſentiment concerning the proximate cauſe of inflammation. See Dictionary of Practical Surgery.

Treatment of Inflammation.—According to the preceding views of the ſubject, the firſt and principal object to be aimed at in the treatment of inflammation, is to diminiſh that immoderate action of the arteries, which exiſts in ſo conſpicuous a degree. There are ſeveral means conducive to this end; but that which demands primary attention, and, indeed, which ſeems to be indicated by common ſenſe, is to remove, if poſſible, whatever conſtitutes the remote or exciting cauſe of the inflammation. Thus, ſuppoſing the eye were to inflame in conſequence of a ſmall inſect lodging under the eyelids, how obvious would be the propriety of immediately taking away the ſource of irritation? If the irritation of a thorn or ſplinter ſhould excite inflammation, who would not of his own accord endeavour to extract the extraneous ſubſtance? When the affection is excited by extravaſated urine, by preſſure, friction, ſtimulating applications, &c. the ſurgeon often has it in his power to render moſt eſſential ſervice, by removing at once what excites and keeps up the complaint. Frequently, the exciting cauſe is tranſient in its operation, and yet, the inflammation cannot be prevented from running a certain courſe. Thus, many kinds of external violence are inflicted in a moment; but inflammation muſt follow, and go through its operations, though the duration of the circumſtance which gave riſe to the proceſs has ceaſed. The living ſolids demonſtrate, in theſe inſtances, a kind of reaction. Since, therefore, the removal of the ſtimulus which excites inflammation will not always put an immediate ſtop to the complaint, however it may tend to alleviate it, we are generally called upon to moderate, by other means, the increaſed vaſcular action.

There are few perſons ſo entirely ignorant of the ſubject before us, as not to know that bleeding is one of the moſt powerful means of counteracting inflammation. This well known fact, which has obtained the aſſent of the moſt celebrated phyſicians and ſurgeons in every age and country, can hardly fail to be quite congenial with ſuch ideas and expectations as are naturally impreſſed upon the mind by a deſcription of the diſorder. Indeed, one principal effect of the increaſed action of the veſſels, is the tranſmiſſion of a larger quantity of blood through the inflamed part. The propriety of endeavouring, therefore, in moſt caſes, to diminiſh this determination of blood to the ſeat of the inflammation, cannot be doubted. The chief mode of accompliſhing this object is by general and topical bleeding. This evacuation is called *general*, when the blood is taken from a large veſſel, at a diſtance from the inflamed part; *local* or *topical*, when the blood is evacuated by leeches, ſcarifications, or cupping, from the veſſels which are near, or belong to the inflamed part. General bleeding is not ſo invariably proper as topical.

cal. Inflammation is a local affection, and therefore muſt particularly require local curative means. Objections have been urged againſt topical bleeding, except when the ſkin, over and near the inflamed part, is itſelf free from the inflammation. However, moſt ſurgeons in this country think otherwiſe; they put leeches on the inflamed ſkin, and even ſcarify the dilated veſſels of the conjunctiva, in caſes of ophthalmy, as we think, with decided good effect. It is alſo an incontrovertible truth that bleeding is generally more effectual, the nearer the evacuation is made to the ſeat of the inflammation. But it is not always in our power to take away a ſufficient quantity of blood in this manner. Many inflammations muſt be immediately checked, or the patient is deſtroyed. Therefore, when inflammation affects a part of ſuch conſequence in the animal economy that it cannot undergo much diſturbance, without life itſelf being endangered, the ſurgeon is not to be ſatisfied with local meaſures. Thus, when the brain, the lungs, the ſtomach, the bowels, &c. are inflamed, the inflammation, unleſs ſuddenly arreſted, will inevitably end in death. Alſo, when the inflamed parts are endued with inferior powers of recovery, it is often neceſſary to have recourſe to general as well as topical bleeding; as in inflammation of a joint. When inflammation is ſituated in an organ, where ſuppuration would certainly deſtroy its uſes, it is likewiſe adviſable to moderate the local affection, even at the expence of the whole ſyſtem. Ophthalmy is a caſe of this kind. Moreover, it ought to be well underſtood that every conſiderable and extenſive phlegmonous inflammation, whereſoever ſituated, ought always to be reſiſted by general bleeding.

There is no utility in bleeding, when the inflammation and fever are trivial, and the cauſe of the diſorder can be entirely removed. Such evacuation muſt often be hurtful and dangerous, when the patient is much debilitated by previous indiſpoſition, extreme age, or any other circumſtance. The ſymptomatic fever, attendant on inflammation, can ſeldom be of itſelf a juſt ground for bleeding, as it conſtantly increaſes and ſubſides with the local affection. We are, therefore, to be principally guided by the ſtate of the inflammation. Bleed with a view of diminiſhing this, but never for the ſole purpoſe of leſſening the fever.

It is a principle very generally acknowledged by ſurgeons, that the efficacy of bleeding is greater the ſooner it is practiſed, the nearer it is done to the part affected, and the more ſuddenly the blood is diſcharged. Hence, when an organ, like the brain, is inflamed, and it is an object of infinite moment to put an immediate check to the inflammation, the ſurgeon ſhould take away in the firſt inſtance ſixteen or twenty ounces of blood, if poſſible, from the temporal arteries; but if that quantity cannot be thus procured, the deficient proportion ought to be taken from the arm.

Another plan, calculated to check and diminiſh inflammation, and which is neceſſary in almoſt all caſes, is to give the patient mild aperient medicines, ſuch as Epſom ſalt, Glauber's ſalt, magneſiæ ſulphas, &c. Strong draſtic purgatives, by their irritation on the conſtitution, are ſeldom allowable, and almoſt always prove hurtful. Gentle purging is even more invariably proper, in all caſes where inflammation already exiſts, or is to be apprehended, than bleeding; for this latter evacuation is productive of more laſting weakneſs, and therefore, in ſlight caſes, and weak habits, is generally diſpenſed with. Purging probably counteracts inflammation, firſt by increaſing the ſecretion of the bowels, ſo as to leſſen the quantity of the circulating fluids; and ſecondly, by ſpecifically diminiſhing every operation going on in the body, and among others, inflammatory action.

In many inſtances, the effect of the aperient medicines is to be promoted with clyſters. Indeed, there are ſome examples, where the latter are ſafer than purgatives given by the mouth: when the peritoneum and bowels are inflamed, the prudent ſurgeon is often afraid to preſcribe any very active opening medicines. Perhaps he ventures to exhibit half an ounce of the oleum ricini, which frequently does not take effect, although the doſe be repeated, until aſſiſted with a clyſter.

Antimonial medicines have acquired conſiderable reputation in numerous caſes of inflammation, and, as far as we can judge, they are really of eminent ſervice. Nauſeating doſes of antimonium tartarizatum prove advantageous in ſeveral ways; they relieve that oppreſſive dryneſs of the ſkin, which accompanies the fever attendant on ſevere local inflammation; they promote all the excretions; and they diminiſh the increaſed action of the inflamed part. The latter effect is produced, becauſe, whenever an inclination to ſickneſs prevails, the ſympathy of the whole conſtitution with the ſtomach is ſo intimate, that the ſyſtem is immediately thrown into a temporary ſtate of debility, every conſiderable operation in the machine becoming lowered, and, among others, the proceſs of inflammation. When the inflammation is dangerous, and there is urgent reaſon for putting an immediate check to it, the employment of antimonials ought never to be neglected. Thus, when the brain or its membranes are affected with inflammation, it is uſual to exhibit ſmall doſes of antimony.

Opium is not preſcribed in caſes of common inflammation, unleſs the ſeverity of the pain render this medicine indiſpenſably neceſſary; for it is generally conſidered as a powerful ſtimulant, and therefore hurtful in regard to the local complaint. Inſtances, however, certainly do preſent themſelves, in which opium is proper. Procuring the patient eaſe and ſleep, during the violence of many ſevere inflammations, is an object of the higheſt importance; and, it may be queſtioned whether the inflammation itſelf would not be aggravated more by leaving the patient to all his pain and reſtleſsneſs, than by making an attempt to diminiſh his ſufferings, and lull him to ſleep by opiates. One thing ſeems certain, that if opium is to be given in caſes where pain and inflammation exiſt, it ſhould be preſcribed in an adequate doſe. Thus, after any great operation, ſuch as an amputation, the removal of a breaſt, &c. the ſurgeon ſhould give from twenty-five to forty drops of the tinctura opii; ſmall doſes of opium, in ſuch caſes, always have the effect of ſeriouſly increaſing the reſtleſsneſs, fever, &c. inſtead of affording eaſe, and procuring ſleep.

The patient's regimen and diet are to be low; no ſpirits nor fermented liquors are allowable; and when the inflammation is at all extenſive, or ſuch as to be of conſequence, the patient ſhould abſtain from eating meat, and live on thin broths, barley-water, tea, &c. The practitioner would in vain make depletions in order to ſtop an inflammation, while his patient was living upon groſs, hot, ſtimulating diſhes. On the contrary, when the regimen and diet are ſuch as they ought to be, the patient will do with leſs evacuations, and his health will not be ſo much injured by the requiſite treatment. He ſhould be adviſed to drink plentifully of diluent cooling beverages, like lemonade and acidulated barley-water. Oranges, ſtrawberries, ſaline draughts, &c. may be permitted, as being exceedingly grateful to patients, who are feveriſh and thirſty, from being affected with any ſerious degree of inflammation. The patient's chamber ſhould be kept cool, nor ought he to be covered with two much bedding. The antiphlogiſtic regimen, moreover, requires perfect repoſe both of body and mind.

With regard to the topical applications, theſe are generally either cold aſtringent lotions, or elſe warm relaxing emollients. Heat is well known to promote and increaſe all animal actions, and muſt therefore tend to keep up and augment the proceſs of inflammation. Hence ariſes the indication to diminiſh the heat of the part affected, by making uſe of cold topical applications, and maintaining a continual evaporation from the inflamed ſurface. The common plan is to dip linen in the ſaturnine lotion, and after folding it once or twice, lay it all over the part affected, taking care afterwards to keep it conſtantly wet with the application. In ſome inſtances cold water will anſwer every purpoſe; in others the aqua ammoniæ acetatæ, or lotions of the ſulphate of zinc, alum, &c. may be employed. Poultices made with linſeed-meal and water, or with bread and milk, are the ordinary emollient applications when ſuch are conſidered proper. Thoſe of the firſt kind are frequently preferable to the latter, which are apt to turn ſour and acquire an irritating quality, a circumſtance of high importance where the cuticle is detached, ulceration is preſent, or the part is exquiſitely ſenſible. When poultices are uſed, fomentations are alſo frequently proper, as having in all ſevere caſes a great effect in leſſening the pain. Likewiſe, when ſuppuration is unavoidable, they accelerate the cure by promoting the formation of matter, and haſtening its approach to the ſurface of the body. The common method is to dip flannels in a decoction of chamomile flowers, or white poppy heads, wring them, and apply them very warm to the inflamed part.

In diſcriminating the caſes which require cold applications from others to which warm ones are moſt ſerviceable, the practitioner ſhould always bear in mind, that when ſuppuration is inevitable, it is invariably moſt advantageous to diſcontinue cold aſtringents without delay. In general, where the chance of the inflammation being reſolved is great, cold applications are beſt; but ſometimes the choice of the topical remedies muſt be partly regulated by the patient's feelings. There are ſome patients who ſeem to derive moſt eaſe from cold applications: there are others who appear to experience moſt comfort from cold ones. The latter remedies ought perhaps rather to have the preference, when the proſpect of preventing ſuppuration is fair and rational, and when at the ſame time they afford as much eaſe as poultices.

In technical language, inflammation is ſaid to have different terminations. When the redneſs, ſwelling, heat, and pain, all gradually ſubſide, without any formation of matter, the caſe ends in what is termed *reſolution*, which is the moſt favourable event that can happen.

In ſome inſtances, a change takes place in the action of the veſſels of the inflamed part, and they aſſume the power of ſecreting pus, or matter. Thus an abſceſs is formed, and the caſe (ſurgically ſpeaking) terminates in *ſuppuration*.

In certain examples, ulceration is a direct conſequence of inflammation, but in general an abſceſs precedes the ſore.

The laſt termination of inflammation, to be noticed here, is in *mortification*, which is the worſt, but happily the leaſt frequent reſult of common caſes. See GANGRENE, SUPPURATION, &c.

For an account of particular kinds of inflammation, ſee ERYSIPELAS, ANTHRAX, CARBUNCLE, FURUNCULUS, SCROFULA, LUES VENEREA, &c.

The inflammations of various parts of the body are alſo treated of under diſtinct heads. For inflammation of the eye, ſee OPHTHALMY; for that of the parts about the anus, ſee FISTULA *in Ano*; for that of the dura mater, ſee INJURIES *of the Head*; for that of the teſticle, ſee HERNIA *Humoralis*; for that of the fingers, ſee WHITLOW, &c. &c.

INFLAMMATION *of the Bladder*. See CYSTITIS.

INFLAMMATION *of the Bowels*. See ENTERITIS.

INFLAMMATION *of the Brain*. See PHRENITIS.

INFLAMMATION *of the Diaphragm*. See PARAPHRENITIS.

INFLAMMATION *of the Ear*. See OTALGIA.

INFLAMMATION *of the Eye*. See OPHTHALMY.

INFLAMMATION *of the Heart*. See CARDITIS.

INFLAMMATION *of the Kidneys*. See NEPHRITIS.

INFLAMMATION *of the Liver*. See HEPATITIS.

INFLAMMATION *of the Lungs*. See PLEURISY, PERIPNEUMONY, and CATARRH.

INFLAMMATION *of the Pericardium*. See PERICARDITIS, and CARDITIS.

INFLAMMATION *of the Peritoneum*. See PERITONITIS.

INFLAMMATION *of the Spleen*. See SPLENITIS.

INFLAMMATION *of the Stomach*. See GASTRITIS.

INFLAMMATION *of the Teſtes*. See HERNIA *Humoralis*.

INFLAMMATION *of the Throat*. See CYNANCHE.

INFLAMMATION *of the Tonſils*. See CYNANCHE *Tonſillaris*.

INFLAMMATION *of the Womb*. See HYSTERITIS.

INFLAMMATION, *Spontaneous*, of earthy matters, in *Mining*. It is a curious and important fact, that ſeveral pyritic and bituminous thin ſtrata which are found accompanying the coal-ſeams in ſome ſituations, will, on being thrown out or expoſed to the air in the works, heat and take fire. This ſeems particularly the caſe in the thick coal-ſeam about Dudley in Staffordſhire, as mentioned by Mr. Keir in Shaw's Hiſtory of Staffordſhire. In different parts of Derbyſhire there are alſo thin ſtrata of duns, tows, &c. which thus intumeſce and take fire in the coal-works, as at Heanor, Derby-hall and other pits, which are particularized by Mr. Farey in his Report on this county, vol. i. p. 348.

INFLAMMATORY DISEASES, in *Medicine*, are all thoſe diſeaſes in which any part or organ of the body is affected with inflammation, as above deſcribed; but theſe terms, in the general acceptation, imply more particularly thoſe acute and ſevere inflammations which excite a degree of febrile commotion in the ſyſtem. In addition to thoſe juſt enumerated, with references, the gout, acute rheumatiſm, eryſipelas, &c. may be included under the claſs of inflammatory diſeaſes, and, together with them, conſtitute, in fact, a diſtinct Order, in the ſyſtem of our beſt noſologiſt, Dr. Cullen, under the title of *Phlegmaſiæ*; namely, the ſecond order, of the firſt claſs, *Pyrexiæ*, or *Febrile* diſeaſes. See his Noſol. Method.

We judge of the preſence of an internal inflammatory diſeaſe by the occurrence of the following congeries of ſymptoms; namely, when, together with a ſtate of *fever*, there is a *fixed pain* in any internal part, attended with ſome *interruption* in the exerciſe of *its functions*. It is to be obſerved, that the concurrence of all theſe ſymptoms is neceſſary to prove the exiſtence of active inflammation in any organ, and that the occurrence of any one or two of them may originate from other cauſes than inflammation. Thus pain may ariſe from a ſpaſmodic contraction of the muſcular fibres of the part, and it may be moveable, and paſs from one part to another; fever may ariſe with or without pain; and the functions of an organ may be impeded without either pain or fever. In none of theſe caſes are we to conclude that active inflammation is going on. We may illuſtrate this with reſpect to inflammation of the lungs, or *peripneumony*. This diſeaſe is known to be preſent, when, together with general *fever* (*i. e.* a frequent pulſe, hot ſkin, thirſt, &c.), there is a fixed *pain* in ſome part of the cheſt, *cough*, and *difficulty of breathing*. (Cullen, Noſol. Meth. Claſs i. Ord. ii. Gen. 11.) Now *fever* occurs from many other cauſes, and without theſe other ſymptoms; in which caſe no pulmonic inflammation is judged to be preſent. *Pain* may be felt in the cheſt when there is neither cough nor fever, nor difficult reſpiration, as in the caſe of rheumatiſm in the intercoſtal muſcles, the diaphragm, or perhaps the mediaſtinum, or in the caſe of partial or general ſpaſm in theſe muſcles. It may be alſo felt, with difficulty of breathing, but without fever, as in the caſe of ſpaſm of the diaphragm, in hydrothorax, or in angina pectoris: or it may concur with fever when there may be no cough, as ſometimes happens when the liver is inflamed on the ſurface contiguous to the diaphragm. Again, there may be an impeded function (*i. e.* in this caſe *difficulty of reſpiration*) without fever or pain, as in many caſes of aſthma and chronic dyſpnæa, connected with a ſpaſmodic conſtriction of the bronchial paſſages, or a conſiderable ſecretion of mucus into the cells and bronchial tubes. But where there is inflammation in the lungs, there is neceſſarily, in the firſt place, a ſymptomatic *fever;* in the next, from the congeſtion and over-diſtention of the veſſels of the inflamed organ, there is a fixed *pain*, and alſo a difficulty of admiſſion of air into the compreſſed cells, *i. e. difficult breathing;* and the irritation upon the nerves of the bronchiæ, by this congeſtion, as well as by the mucus ſecreted, neceſſarily excites *cough*.

Theſe concurring phenomena, then, of pain and impeded function in any organ, with general fever, are the diagnoſtic ſymptoms of all internal inflammatory diſeaſes. But there are ſtill other phenomena which indicate the degree of violence of the inflammation which is going on. Theſe are principally the other conditions of the pulſe, beſides its frequency, and the appearance of the blood drawn from the veins. Where an acute inflammation ſubſiſts, the pulſation of the heart and arteries is generally very vigorous; ſo that the pulſe at the wriſt ſtrikes againſt the finger with a conſiderable force, and with a ſharpneſs of ſtroke which elevates the finger, compreſſing the artery, even when firmly held on it. The terms hard, ſtrong, and ſharp, have been uſed to denote this vigorous pulſation of the artery. The degree of hardneſs, ſtrength, or ſharpneſs of the pulſe, however, varies greatly, not only according to the violence of the diſeaſe, but to the vigour of the patient's natural conſtitution; and it differs alſo according to the peculiar ſtructure of the organ inflamed; all of which circumſtances muſt be taken into the conſideration of the phyſician before he decide upon the practical treatment which he ſhall adopt. Even in the moſt ſevere inflammation, which a very delicate habit is capable of undergoing, the pulſe may be leſs full and ſtrong than in a ſlight febrile affection in a robuſt habit; but there is generally a degree of ſharpneſs in the ſtroke of the pulſe, even in a feeble habit under the excitement of acute inflammation, which the *tact*, acquired by a little experience, enables the phyſician to eſtimate. Beſides, in ſuch caſes, the degree of pain and of impeded function, and the ſtate of the pulſe, mutually illuſtrate each other. If the pain has remained fixed and ſevere for many hours, and the function of the ſuffering organ is greatly deranged, although the pulſe may betray but a moderate degree of ſharpneſs or hardneſs in a habit not originally ſtrong, the proper evacuations for the cure of inflammation muſt be conſidered as indicated. This is particularly neceſſary, as we have juſt hinted, in reſpect to certain organs. When there is an acute inflammation in the *lungs* or *liver*, and eſpecially when the enveloping membranes are affected, the pulſe is perhaps invariably characterized by hardneſs and ſtrength. (See Hepatitis and Pleurisy.) But when the *ſtomach* is inflamed, the pulſe is often without any conſiderable hardneſs, and generally ſmall, but very frequent. In this caſe, therefore, the exiſtence of acute inflammation might be overlooked, if we judged principally from the pulſe; and it is neceſſary to compare the ſtate of the pulſe with the degree of fixed burning pain in the ſtomach, and the ſudden increaſe of that pain, as well as the vomiting which is excited by any thing whatever that is taken into the ſtomach, in order to aſcertain the nature of the diſeaſe. See Gastritis.

The other circumſtance, which has been mentioned as aiding us in diſtinguiſhing the degree of violence of any internal inflammation, is the appearance of the blood drawn from the veins. When the lancet is uſed in inflammatory diſeaſes, the blood, which is drawn, after ſtanding ſome time in any veſſel until coagulation has taken place, exhibits, on the ſurface of the *coagulum*, a thick gelatinous ſubſtance, without any admixture of red blood: this has been variouſly termed the *buffy coat*, or ſimply the *buff*, the *inflammatory cruſt*, &c.; and has been conſidered as a proof of the exiſtence of inflammation, and as a teſt, in a great meaſure, of the ſeverity of the diſeaſe. It is certain, that this buffy cruſt is commonly found in pleuriſy, peripneumony, hepatitis, acute rheumatiſm, &c., and is not ſeen where blood flows from a perſon in ordinary health. It ſeems to ariſe from a difference in the mode of coagulation, ſo that the red particles ſubſide and leave the upper portion of the coagulating lymph untinged; and not to conſiſt of a morbid humour in the blood, as the humoral pathologiſts believed. But experience has taught us, that the buffy ſtate of the blood is not a criterion, by which the neceſſity or propriety of blood-letting can be determined in diſeaſes. For, not to mention the abſurdity of relying upon a teſt, which requires the practice to be adopted, to ſome extent or other, before its propriety can be aſcertained; (a doctrine which has often led to the folly of taking away a little blood, "to ſee how it looked,") obſervation has proved, that the blood is actually often in the condition to ſhew the buffy coat, where no inflammatory action is going on, and where, although a certain degree of inflammatory action may be preſent, yet it will not be removed by blood-letting; but if the blood-letting be repeated, the patient may be deſtroyed before the buffy coat on the blood will diſappear. Thus the buffy coat is almoſt invariably ſeen on blood drawn from women in a ſtate of pregnancy; it is likewiſe ſeen on that, which is taken from perſons labouring under hectic fever, from pulmonary conſumption; nay, it has been obſerved on the blood drawn from patients affected with the *typhus* fever, and with *ſcurvy* (ſee Fourcroy, Connoiſſ. Chimiques; alſo Blood, *morbid alterations of*,); in all which caſes we ſhould occaſion infinite miſchief, were we to conceive that this appearance indicated the neceſſity of repeating the uſe of the lancet. But, farther, it is a fact, which has not hitherto been ſatisfactorily explained, that in a violent attack of unequivocal inflammation, as of pleuriſy, if, during one bleeding, the blood be received in two or three different veſſels, the coagulum in one or two of the veſſels ſhall preſent the buffy coat, while none will appear on that in the others; and in like manner, if blood-letting be repeated two or three times, the blood of the firſt drawing ſhall exhibit no buffy cruſt, while that of the ſubſequent drawing ſhall ſhew it in large quantity. This variety has been principally attributed to the velocity with which the blood flows from the vein; thus it would appear, that the blood which trickles ſlowly down the arm, ſeldom ſhews ſo much buff, as that which flows in a full and copious ſtream. In a word, then, the appearances of the blood drawn in the cure of diſeaſes, is to be conſidered as a very imperfect guide in directing the farther uſe of the lancet, and is only to be deemed a ſecondary adjuvant in determining the proper mode of practice, in conjunction with a careful inveſtigation of the violence of the ſymptoms of the diſeaſe, its duration, and tendency, and of the age, ſtrength, and conſtitution of the patient.

In attempting to form an accurate *diagnoſis*, in regard to inflammatory diſeaſes, two difficulties preſent themſelves: the firſt of theſe is the difficulty of diſtinguiſhing the inflammation of one organ from that of another, which is contiguous to it, or in its vicinity. For inſtance, the leading ſymptoms of inflammation of the lungs, in very many caſes, are preſent in hepatitis, or inflammation of the liver, on the one hand, and in carditis, and pericarditis, or inflammation of the heart, and of the pericardium, on the other. The diſtinction, which is commonly ſuppoſed to exiſt between the inflammation of the heart and its membranous bag, and inflammation of the lungs, conſiſts in the occurrence of palpitation, ſyncope, and an irregular pulſe, in the former diſeaſe, in addition to the ſymptoms of the latter: but Dr. Cullen admits that theſe three ſymptoms are occaſionally abſent in *pericarditis*, and accords with the obſervation of Vogel, that "the ſymptoms of *carditis* are nearly the ſame as thoſe of peripneumony, but more ſevere:" *i. e.* fever, with pain in the left ſide of the cheſt, difficulty of breathing, and cough. (See Cullen, Noſol. Meth. Claſs i. Ord. ii. Gen. 13 and 11.) In like manner, theſe four diagnoſtic ſymptoms of peripneumony and pleuriſy are commonly preſent in inflammation of the liver, eſpecially when the convex ſide of that viſcus, which lies in contact with the diaphragm, is the ſeat of the inflammation: for in addition to fever, and pain in the ſide, a difficulty of breathing is occaſioned by the ſuffering, which any attempt to depreſs the diaphragm in the act of inſpiration, excited by compreſſing the inflamed liver; and a cough, which, however, is commonly dry, or unaccompanied by expectoration, but not always, and which is excited probably by the vicinity of the ſeat of irritation to the lungs. As the hepatitis proceeds, the other ſymptoms belonging to it, eſpecially the bilious tinge of the ſkin and eyes, point out clearly the ſeat of the inflammation.

It is ſatisfactory, however, to know that, in ſuch caſes of extreme ſimilarity of ſymptoms, no practical evil can ariſe from the inability to decide as to the ſeat of the diſeaſe: for, in the firſt place, the inflammation actually ſpreads, in ſome inſtances, to the contiguous organs, ſo that the ſymptoms indicative of the diſorder in both muſt neceſſarily co-exiſt; and, in the ſecond place, the inflammation requires the ſame practical meaſures to be adopted for its removal, in whatever viſcus it may be ſeated; namely, evacuations proportioned to its violence, and to the vigour of the patient.

The ſecond difficulty, in diſtinguiſhing inflammatory diſeaſes, to which we have alluded, ariſes from the occaſional ſeverity and fixed ſeat of the pain, which is attendant on cramps or ſpaſmodic diſeaſes, more eſpecially in the ſtomach and the bowels. Hence it is often extremely difficult to pronounce, whether an acute pain in the belly, for inſtance, is occaſioned by the *colic*, or by *enteritis* (inflammation of the bowels), for conſtipation accompanies both; and although a mere ſpaſmodic pain is very commonly preſent, without any acceleration of the pulſe, or febrile heat; yet when ſuch pain is extremely acute, and has continued for ſome length of time, the conſtitution begins to ſuffer from exceſſive irritation, and the pulſations of the heart and arteries are quickened; and if it ſtill continues, actual inflammation in the part is liable to enſue, ſo that what was colic in the commencement, becomes finally enteritis. It is important to diſcriminate accurately in the outſet between theſe two ſtates of pain; becauſe that, which is ſpaſmodic, may be removed by large doſes of opium, and other antiſpaſmodics; whereas the inflammatory pain would be augmented, and the diſeaſe itſelf rendered more dangerous, by the exhibition of ſuch medicines. In making this diſcrimination, the practitioner is principally guided by the hardneſs and force, or the ſoftneſs and weakneſs of the pulſe;—by the rigidity of fibre and robuſt habit, or the contrary condition of the patient;—by the unvarying intenſity and ſeat of the pain, or its occaſional remiſſions and ſlight change of place;—and by a knowledge of the nature of former attacks, of a ſimilar kind, where ſuch have occurred.

The experienced and accurate obſerver of the phenomena of diſeaſes, therefore, will ſeldom be at a loſs in ſelecting the proper mode of treatment in ſuch caſes: and it is fortunate here alſo, that the evacuation of blood-letting, which is abſolutely neceſſary to ſubdue a violent inflammatory affection of the bowels, often ſucceeds in removing a fixed and ſevere ſpaſm in the ſame organs. And as a ſpaſmodic affection, of conſiderable duration, is liable to terminate in inflammation and its fatal conſequences, the depletion of the blood-veſſels is indicated, under ſuch circumſtances, both as a preventive and as a cure, where the age, ſtrength, and conſtitution of the patient do not render the ſafety of ſuch a depletion very equivocal.

In regard to the treatment of inflammatory diſeaſes, we have already in part anticipated the diſcuſſion. The great deciſive remedy for ſuch diſeaſes is found, in diminiſhing the quantity of the circulating blood. This operation of blood-letting is ſuppoſed to produce its beneficial effects upon the diſeaſe, by removing the "ſtimulus of diſtention" from the blood-veſſels; for it is an aſcertained property of the living ſolid, to contract more forcibly after a great extenſion of its fibres. It cannot operate by letting out the *morbid matter* or *humour* from the circulating fluids, as the older pathologiſts imagined; for if we ſuppoſe the whole maſs of fluids to be impregnated with a morbid humour, how can we, by abſtracting a part, purify the condition of the remainder? The fact, however, is fully eſtabliſhed, and cannot be invalidated by any error in the hypotheſis, which may be framed for the purpoſe of explaining it. The depletion of the veſſels may be effected by opening the ſmaller branches of the arteries, where they are ſuperficial, and eaſily ſubjected to preſſure, as in the temples; or by opening the external veins by the lancet; or by a more limited and topical diſcharge by means of leeches, and cupping. The circumſtances, under which one or other of theſe modes of depletion is to be preferred, vary materially according to the ſeat and degree of inflammation, and will be mentioned under the head of each diſeaſe. While this mode of reducing inflammatory action is reſorted to, it is generally neceſſary, alſo, to employ other concurring means; ſuch as purging, exciting a diaphoreſis or gentle perſpiration, procuring a diſcharge from the ſkin in the vicinity of the inflamed organ, by bliſters, &c.; and, at the ſame time, to employ all the negative means of diminiſhing excitement, which conſtitute the antiphlogiſtic regimen; ſuch as avoiding heat, noiſe, exertion of body or mind, and ſhunning all ſolid animal food, condiments, ſpirituous, vinous, or other fermented liquors, which increaſe the action of the vaſcular ſyſtem.

INFLATION, formed from *in*, and *flatus*; of *flo*, *I blow*; *blowing up*, the act of ſtretching or filling any flaccid or diſtenſible body, with a flatulent or windy ſubſtance.

INFLECTION, called alſo *diffraction*, and *deflection*, in *Optics*, is a property of light, by reaſon of which, when it comes within a certain diſtance of any body, it will either be bent from it, or towards it; which is a kind of imperfect reflection or refraction. See Diffraction.

This property was firſt taken notice of by Dr. Hooke; who ſhews that it differs both from *reflection* and *refraction;* and ſeems to depend on the unequal denſity of the conſtituent parts of the ray, whereby the light is diſperſed from the place of condenſation, and rarified or gradually diverged into a quadrant: and this deflection, he ſays, is made towards the ſuperficies of the opaque body perpendicularly. Some writers aſcribe the firſt diſcovery of it to Grimaldi, the Jeſuit. He firſt publiſhed an account of it, in his treatiſe "De Lumine, Coloribus, et Iride," printed in 1666; nor did any other perſon lay claim to the diſcovery, except Dr. Hooke, who communicated his obſervations on this ſubject to the Royal Society, in 1672. It appears, however, that Dr. Hooke had not heard of the diſcoveries of Grimaldi; for he ſpeaks of his own as a diſcovery of a new property of light, not mentioned by any optical writer before him.

Sir Iſaac Newton diſcovered alſo, by plain experiment, this inflection of the rays of light; and M. de la Hire aſſures us he found, that the beams of the ſtars being obſerved, in a deep valley, to paſs near the brow of a hill, are always more refracted than if there were no ſuch hill, or the obſervations were made on the top thereof; as if the rays of light were bent down into a curve, by paſſing near the ſurface of the mountain.

Sir Iſaac Newton, in his Optics, makes ſeveral experiments and obſervations on the inflection of the rays of light; which ſee under Light, and Rays.

Although ſir I. Newton particularly examined the phenomena, relating to this ſubject, under a conſiderable variety of circumſtances, his obſervations were not quite correct; nor was his hypothetical explanation very plauſible. Subſequent experiments and obſervations ſeem to reduce the phenomena of inflection to a ſingle principle, *viz.* to the attraction of bodies towards light; which attraction becomes conſpicuous when the rays of light paſs within a certain diſtance of their ſurfaces. Beſides their being bent, the rays of light are likewiſe ſeparated into colours by the vicinity of bodies, and this produces the ſingular phenomenon of the coloured fringes that accompany the inflection. Various experiments have been made relative to the inflection of light by Maraldi, Grimaldi, Deliſle, Mairan, Du Tour, Muſchenbroek, and others, as well as Newton; an account of which experiments the reader may ſee in Prieſtley's Hiſtory of Viſion, Light, and Colours, part vi. § 6.

M. de la Hire obſerved, that when we look at a candle, or any luminous body, with our eyes nearly ſhut, rays of light are extended from it, in ſeveral directions, to a conſiderable diſtance, like the tails of comets. The true occaſion of this phenomenon, which has exerciſed the ſagacity of Des Cartes, Rohault, and others, ſeems to be, that the light paſſing among the eye-laſhes, in this ſituation of the eye, is inflected by its near approach to them, and therefore enters the eye in a great variety of directions.

Inflection, in *Grammar*, the variation of nouns and verbs, in their ſeveral caſes, tenſes, and declenſions.

Inflection is a general name, under which are comprehended both conjugation and declenſion.

Inflection, *Point of*, of a curve, in *Geometry*, is a point or place where the curve begins to bend, or turn a contrary way.

If a curve line, as A F K (*Plate* X. *Analyſis*, *fig.* 2.) be partly concave, and partly convex towards a right line, as A B, or towards a fixed point, the point F, which divides the concave from the convex part, and conſequently is at the beginning of the one and end of the other, is called the *point of inflection*, as long as the curve, being continued beyond F, keeps its courſe the ſame: when it returns back again towards that part or ſide from whence it took its origin, it is called the *point of retrogreſſion*.

To conceive this, it is to be conſidered, that any quantity, which goes on continually increaſing or decreaſing, cannot change from a poſitive to a negative expreſſion, or from a negative to a poſitive one, without firſt becoming equal to an infinite, or nothing. It becomes equal to nothing, if it continually decreaſe; and equal to an infinite if it continually increaſe.

Now, if through the point F be drawn the ordinate E F, and the tangent F L, and from any point, as M, on the ſame ſide of A F, be drawn the ordinate M P, and the tangent M T; then in curves which have a point of inflection, the abſciſs A P continually increaſes, and the part A T of the diameter, intercepted between the vertex of the diameter, and the tangent M T, increaſes alſo, till the point P fall into E; after which it again begins to diminiſh: whence the line A T muſt become a maximum A L, when the point P falls into the point E.

In thoſe curves which have a point of retrogreſſion, the part A T increaſes continually, and the abſciſs increaſes, till the point T falls into L; after which it again diminiſhes: whence A P muſt become a maximum, when the point T falls into L.

If A E $= x$, E F $= y$, then will A L $= \frac{y\,\dot{x}}{\dot{y}} - x$ (ſee Tangent), whoſe fluxion, which is $\frac{y^2\,\dot{x} - \ddot{y}\,\dot{x}\,y}{\dot{y}^2} - \dot{x} = \frac{\dot{y}^2\,\dot{x} - \ddot{y}\,\dot{x}\,y - \dot{y}^2\,\dot{x}}{\dot{y}^2} = -\frac{\ddot{y}\,\dot{x}\,y}{y^2}$, ſuppoſing $\dot{x}$ conſtant, being divided by $\dot{x}$, the fluxion of A L muſt become nothing; *i. e.* $\frac{-\ddot{y}\,y}{\dot{y}^2} = 0$: ſo that multiplying by $\dot{y}^2$, and dividing by $-y$, $\ddot{y} = 0$; which is a general form for finding F, the point of inflection, or retrogreſſion, in thoſe curves whoſe ordinates are parallel to one another. For the nature of the curve A F K being given, put the equation of the curve into fluxions; from which, or from other properties of the curve, find the value of $\dot{x}$ or $\dot{y}$, and put this $\dot{x}$ or $\dot{y}$ and its value into fluxions, making both $\dot{x}$ and $\ddot{y} = 0$: then by expunging the reſt of the fluxional quantities, we ſhall determine the value of x, *i. e.* A E or y, *i. e.* E F, at the point of inflection ſought.

To diſtinguiſh the points of inflection from thoſe of retrogreſſion, which ariſe indiſcriminately according to the above method, it will be ſufficient to attend to the progreſs of the curve, by taking any ordinate very near the point; which will always ſerve to remove any doubt on that head.

Ex. 1.—To find the point of inflection B in the curve A B Y (*fig.* 3.) whoſe equation (putting the abſciſs A C $= x$, ordinate C B $= y$, and the perpendicular A E $= a$) is $a\,x^2 = a^2\,y + x^2\,y$. From the fluxion of this equation, *viz.* $2\,a\,x\,\dot{x} = a^2\,\dot{y} + 2\,x\,\dot{x}\,y + x^2\,\dot{y}$, we deduce $\dot{y} = \frac{2\,a\,x\,\dot{x} - 2\,x\,\dot{x}\,y}{a^2 + x^2}$ *i. e.* by ſubſtituting for y its value $\frac{a\,x^2}{a^2 + x^2}$, $\dot{y} = \frac{2\,a^3\,x\,\dot{x}}{(a^2 + x^2)^2}$; and the fluxion of this equation, making both $\dot{x}$ and $\ddot{y} = 0$, is $0 = \frac{2\,a^3\,\dot{x}^2\,(a^2 + x^2)^2 - (4\,a^2\,x\,\dot{x} + 4\,x^3\,\dot{x})\,2\,a^3\,x\,\dot{x}}{(a^2 + x^2)^4}$, which multiplied by $(a^2 + x^2)^4$ and divided by $2a^3\dot{x}^2$, gives $0 = (a^2 + x^2)^2 - 4a^2x^2 - 4x^4$; therefore, $4x^4 + 4a^2x^2 = (a^2 + x^2)^2$; which equation divided by $x^2 + a^2$ makes $4x^2 = a^2 + x^2$; therefore $3x^2 = a^2$, and $x = a\sqrt{\tfrac{1}{3}}$; and if this value be ſubſtituted for it in the given equation of the curve, we ſhall have y, or the ordinate at the point of inflection $= \frac{ax^2}{a^2 + x^2} = \frac{\frac{1}{3}a^3}{\frac{4}{3}a^2} = \frac{1}{4}a$. Let A C be equal to $\frac{1}{3}$ A E, and with the radius c E, deſcribe the arc E C; then will C be the point from which the ordinate to the point of inflection muſt be drawn: for $e\mathrm{C} = \frac{2}{3}a$; and $\mathrm{C}e^2 - e\mathrm{A}^2 = \mathrm{AC}^2$, *i. e.* $\frac{4}{9}a^2 - \frac{1}{9}a^2 = \frac{1}{3}a^2 = \mathrm{AC}^2 = x^2$; or $x = a\sqrt{\tfrac{1}{3}}$.

Another method of finding the point of inflection, or retrogreſſion, is as follows. From the nature of curvature it is evident, that while a curve is concave towards its axis, the fluxion of the ordinate decreaſes, or is in a decreaſing ratio, with regard to the fluxion of the abſciſs; and on the contrary, this fluxion increaſes, or is in an increaſing ratio to the fluxion of the abſciſs, when the curve is convex towards the axis; and hence it follows, that theſe two fluxions are in a conſtant ratio at the point of inflection, or retrogreſſion, where the curve is neither concave nor convex; that is, $\frac{\dot{x}}{\dot{y}}$, or $\frac{\dot{y}}{\dot{x}}$, is a conſtant quantity. But conſtant quantities have no fluxion, or their fluxion is equal to 0; whence we derive this general rule.

Put the given equation of the curve into fluxions; from which equation of the fluxions, find either $\frac{\dot{x}}{\dot{y}}$, or $\frac{\dot{y}}{\dot{x}}$, and take again the fluxion of this fraction, and make it equal to 0, and from this laſt equation find alſo the value of the ſame expreſſion $\frac{\dot{x}}{\dot{y}}$, or $\frac{\dot{y}}{\dot{x}}$; and by equating theſe two, and the given equation of the curve, x and y will be determined, being the abſciſs or ordinate anſwering to the point of inflection. Or, otherwiſe, putting the fluxion of $\frac{\dot{x}}{\dot{y}} = 0$, that is $\frac{\ddot{x}\dot{y} - \ddot{y}\dot{x}}{\dot{y}^2} = 0$; or $\ddot{x}\dot{y} - \ddot{y}\dot{x} = 0$, whence $\ddot{x}\dot{y} = \ddot{y}\dot{x}$, or, $\dot{x} : \dot{y} :: \ddot{x} : \ddot{y}$, that is, the ſecond fluxions have the ſame ratio as the firſt fluxions; and therefore if $\dot{x}$ be conſtant, or $\ddot{x} = 0$, then ſhall $\ddot{y} = 0$, which gives the following rule, *viz.*

Take both the firſt and ſecond fluxions of the given equation of the curve; in which make $\ddot{x} = 0$, and $\ddot{y} = 0$, and the reſulting equations will determine the values of x and y, or the abſciſs and ordinate anſwering to the required point.

Thus repeating again the preceding example, in which the given equation is $ax^2 = a^2y + x^2y$; and of which the point of inflection is required.

By the firſt rule, the fluxion of $ax^2 = a^2y + x^2y$, is $2ax\dot{x} = a^2\dot{y} + 2xy\dot{x} + x^2\dot{y}$; whence $\frac{\dot{x}}{\dot{y}} = \frac{a^2 + x^2}{2ax - 2xy}$.

And now making again the fluxion of this quantity $= 0$, we have

$$2x\dot{x}(ax - xy) = (a^2 + x^2)(a\dot{x} - y\dot{x} - x\dot{y});$$

whence
$$\frac{\dot{x}}{\dot{y}} = \frac{a^2 + x^2}{a^2 - x^2} \times \frac{x}{a - y}.$$

And now equating theſe two expreſſions, we have

$$\frac{a^2 + x^2}{a^2 - x^2} \times \frac{x}{a - y} = \frac{a^2 + x^2}{2x} \times \frac{1}{a - y},$$

which being reduced, gives $2x^2 = a^2 - x^2$, or $3x^2 = a^2$, and $x = a\sqrt{\tfrac{1}{3}}$, the ſame reſult as before; and this value of x ſubſtituted in the original equation of the curve, becomes

$$y = \frac{ax^2}{a^2 + x^2} = \frac{\frac{1}{3}a^3}{\frac{4}{3}a^2} = \frac{1}{4}a,$$ the ordinate at the point of inflection.

The ſecond method differs from the firſt rather in enunciation than in principle, the application of it is therefore omitted.

Ex. 2.—Again, let it be propoſed to find the point of inflection in a curve whoſe equation is $by^2 = ax^2 - x^3$.

The fluxion of this expreſſion gives

$$b^2\dot{y} = 2ax\dot{x} - 3x^2\dot{x}; \text{ or } \frac{\dot{y}}{\dot{x}} = \frac{2ax - 3x^2}{b^2}.$$

Taking again the fluxion of this expreſſion, and making it equal to 0, we have

$$2ab^2\dot{x} - 6b^2x\dot{x} = 0, \text{ or } 2ab^2 = 6b^2x,$$

becauſe $\dot{y}$ does not enter; whence $x = \frac{1}{3}a$, which is the abſciſs anſwering to the point of inflection ſought.

Ex. 3.—Let it be propoſed to find the point of inflection, or retrogreſſion, in the cubic parabola, with the equation $y = a + \sqrt[3]{(a^3 - 2a^2x + ax^2)}$.

By taking the fluxion, we have

$$\dot{y} = \frac{(-2a^2 + 2ax)\dot{x}}{3(a^3 - 2a^2x + ax^2)^{\frac{2}{3}}}, \text{ or } \frac{\dot{y}}{\dot{x}} = \frac{\frac{2}{3}(ax - 2a^2)}{(a^3 - 2a^2x + ax^2)^{\frac{2}{3}}}.$$

Taking again the fluxion of this expreſſion, and making it equal to 0, according to the above rule, we have $a\dot{x}$

$$(a^3 - 2a^2x + ax^2)^{\frac{2}{3}} = \frac{2(-2a^2\dot{x} + 2ax\dot{x}) \times (2ax - 2a^2)}{3(a^3 - 2a^2x + ax^2)^{\frac{1}{3}}}$$

becauſe $\dot{y}$ is not found in the ſecond fluxion, which expreſſion being reduced, gives $x = a$; and this value ſubſtituted for x, gives alſo $y = a$; hence the point required is, that anſwering to theſe conditions of the abſciſs and ordinate, which is a point of retrogreſſion, as will appear from conſidering the nature of the curve.

Ex. 4.—Let it be propoſed to inveſtigate the point of contrary flexure in the curve commonly called the *witch*; of which the equation is $y^2x = a^3 - a^2x$.

Taking the fluxion of this expreſſion, we have

$$2y\dot{y}x + y^2\dot{x} = -a^2\dot{x}; \text{ or } \frac{\dot{y}}{\dot{x}} = \frac{-(a^2 + y^2)}{2yx}.$$

Now, again, making the fluxion of this expreſſion $= 0$, we have

$$-4y^2\dot{y}x + (2x\dot{y} + 2y\dot{x})(a^2 + y^2) = 0, \text{ or}$$
$$2x(a^2 + y^2)\dot{y} - 4y^2x\dot{y} + 2y\dot{x}(a^2 + y^2) = 0;$$

whence

$$\frac{\dot{y}}{\dot{x}} = \frac{-2y(a^2 + y^2)}{2x(a^2 + y^2) - 4y^2x}.$$

And now equating this value of $\frac{\dot{y}}{\dot{x}}$ with the foregoing, there is obtained

$$\frac{2y(a^2+y^2)}{2x(a^2+y^2)-4y^2x}=\frac{a^2+y^2}{2yx}$$

or, $4y^2x = 2x(a^2+y^2) - 4y^2x$, or $4y^2 = a^2+y^2$; whence $y = a\sqrt{\tfrac{1}{3}}$; which being ſubſtituted in the original equation, gives $x = \tfrac{3}{4}a$; which are therefore the values of x and y anſwering to the required point of inflection.

At preſent we have only conſidered thoſe curves that have parallel ordinates, and which are referred to one common axis; but it is neceſſary to employ a different method when the curves are referred to a common focus; it will therefore be proper now to attend to this latter caſe, obſerving only, with regard to the former, that in order to know whether any curve be concave or convex towards any point aſſigned in the axis, find the value of $\ddot{y}$ at that point; then if this value be poſitive, that curve will be convex towards the axis, and if it be negative, it will be concave. The rule for determining the points of contrary flexure and retrogreſſion of curves, which ſuppoſes the ſecond fluxion of the ordinate to be nothing or infinite, *i. e.* $\ddot{y} = 0$ or ∞, is liable to ſeveral exceptions, as is ſhewn very fully and clearly by Maclaurin in his Treatiſe of Fluxions, book i. chap. 9. book ii. chap. 5. art. 866 and 867.

The ordinate y paſſes through a point of contrary flexure when, the curve being continued on both ſides of the ordinate, $\dot{y}$ is a maximum or minimum. But this does not always happen when $\ddot{y} = 0$, or ∞. Maclaurin obſerves, in general, that if $\ddot{y}$, $\dddot{y}$, $\ddddot{y}$, &c. vaniſh, the number of theſe fluxions being odd, and the fluxions of the next order to them having a real and finite value, then y paſſes through a point of contrary flexure; but if the number of theſe fluxions that vaniſh be even, it cannot be ſaid to paſs through ſuch a point; unleſs it ſhould be allowed that a double infinitely ſmall flexure can be formed at one point.

The curve being ſuppoſed to be continued from the ordinate y, on both ſides, if $\ddot{y}$ be infinite, the extremity of the ordinate is not therefore always a point of contrary flexure, as $\dot{y}$ is not always, in this caſe, a maximum or minimum; and the curve may have its concavity turned the ſame way on both ſides of the ordinate. But theſe caſes may be diſtinguiſhed by comparing the ſigns of $\ddot{y}$ on the different ſides of the ordinate; for when theſe ſigns are different, the extremity of y meeting the curve is a point of contrary flexure.

The ſuppoſitions of $\dot{y} = 0$, or ∞, and of $\ddot{y} = 0$, or ∞, ſerve to direct us where we are to ſearch for the maxima and minima, and for points of contrary flexure; but we are not always ſure of finding them. For though an ordinate or fluxion that is poſitive, never becomes negative at once, but by increaſing and decreaſing gradually, yet after it has decreaſed till it vaniſh, it may thereafter increaſe, continuing ſtill poſitive; or after increaſing till it becomes infinite, it may thereafter decreaſe without changing its ſign.

Of the points of inflection and retrogreſſion of curves referred to a common focus.

Let A D E (*figs.* 4. and 5.) repreſent a curve referred to the focus Q, from whence the ordinates Q D, Q D proceed; and let Q d be indefinitely near to Q D. Draw Q T perpendicular to Q D, and Q t perpendicular to Qd. Draw D T a tangent to the point D, and d t a tangent in the point d. Let Q t (produced if neceſſary) meet D T in the point o. Now it is plain, that as the ordinates increaſe, if the curve be concave towards the focus Q (*fig.* 4.), Q t will be greater than Q T; but if the curve be convex towards the focus Q (*fig.* 5.) Q t will be leſs than Q T; and therefore, as the curve changes from being concave to convex, or *vice verſâ*, that is, in the point of inflection, or retrogreſſion, the line or quantity $o\,t$, from being poſitive, ought to become negative, or the contrary; and therefore muſt paſs through nothing or infinity.

Therefore make Q D = y, D M = $\dot{x}$, and with the centre Q, let the indefinitely ſmall arcs D M, T H, be deſcribed: then the two triangles d M D, d Q T will be ſimilar, as alſo d Q o, T H o, and therefore it will be d M : M D :: d Q (or D Q) : Q T, or $\dot{y} : \dot{x} :: y : \frac{\dot{x}y}{\dot{y}} =$ Q T. But the two ſectors D Q M, T Q H are alſo ſimilar; whence D Q : D M :: Q T : T H, or $y : \dot{x} :: \frac{y\dot{x}}{\dot{y}} : \frac{\dot{x}\dot{x}}{\dot{y}} =$ T H; and becauſe of the ſimilar triangles d Q o, and T H o, it will be d Q (or D Q) : Q o (or Q T) :: T H : H o; that is, $y : \frac{y\dot{x}}{\dot{y}} :: \frac{\dot{x}^2}{\dot{y}} : \frac{\dot{x}^3}{\dot{y}^2} =$ H o. But H t (*fig.* 3.) repreſents the fluxion of Q T, that is, H $t = \frac{\dot{x}\dot{y}^2 - y\dot{x}\ddot{y}}{\dot{y}^2}$ by taking $\dot{x}$ as conſtant. Therefore $t\,o = t$ H + H $o = \frac{\dot{x}\dot{y}^2 - y\dot{x}\ddot{y} + \dot{x}^3}{\dot{y}^2}$, which muſt be equal to 0, or to ∞, infinity; and conſequently multiplying by $\dot{y}^2$, and dividing by $\dot{x}$, it will be $\dot{y}^2 - y\ddot{y} + \dot{x}^2 = 0$, or ∞.

In *fig.* 4. $o\,t$ becomes negative, and therefore $o\,t = \frac{-\dot{x}\dot{y}^2 + y\dot{x}\ddot{y} - \dot{x}^3}{\dot{y}^2}$, and multiplying and dividing this expreſſion as above, we have again

$$\dot{y}^2 - y\ddot{y} + \dot{x}^2 = 0, \text{ or } \infty,$$

which therefore is the general formula for finding the point of inflection or retrogreſſion in curves that are referred to a focus.

Let us now make an application of this formula to an example, by propoſing to find the point of contrary flexure in the curve, which is generated as follows:

A E D being a circle deſcribed from the centre B, let A F K be ſuch a curve, that, drawing any radius B F E, the ſquare of F E may be always equal to the rectangle of the correſponding arc A E, into a right line b. See *fig.* 6.

Let the arc A E = z, B A = B E = a, B F = y, and F G = $\dot{x}$, drawing B E′ indefinitely near to B E, and with the centre B, and radius B F deſcribe the ſmall arc F G; then by the nature of the curve, it will be $bz = a^2 - 2ay + y^2$; and taking the fluxions we have $b\dot{z} = -2a\dot{y} + 2y\dot{y}$, whence $\dot{z} = \frac{2y\dot{y} - 2a\dot{y}}{b} =$ B E′. But becauſe of the ſimilar ſectors B E E′, and B F G, it will be as B E : B F :: E E′ : F G; that is, $a : y :: \frac{2y\dot{y} - 2a\dot{y}}{b} : \dot{x}$; whence $\dot{x} = \frac{2y^2\dot{y} - 2ay\dot{y}}{ab}$; and now taking the fluxions again and making $\dot{x}$ conſtant, we have $4y\dot{y}^2 + 2y^2\ddot{y} - 2a\dot{y}^2 - 2ay\ddot{y} = 0$; therefore $y\ddot{y} = \frac{a\dot{y}^2 - 2y\dot{y}^2}{y - a}$.

Now the general formula above is $\dot{x}^2 + \dot{y}^2 - y\ddot{y} = 0$, and therefore ſubſtituting for theſe quantities their reſpective values, the expreſſion becomes

$$\frac{4 y^{4} \dot{y}^{2} - 8 a y^{3} \dot{y}^{2} + 4 a^{2} y^{2} \dot{y}^{2} + a^{2} b^{2} \dot{y}^{2}}{a^{2} b^{2}} -$$

$$\frac{a \dot{y}^{2} - 2 y \dot{y}^{2}}{y - a} = 0,$$ and theſe again reduced to a common denominator will be

$$\frac{4 y^{5} - 12 a y^{4} + 12 a^{2} y^{3} - 4 a^{3} y^{2} + 3 a^{2} b^{2} y - 2 a^{3} b^{2}}{a^{2} b^{2} (y - a)}$$

$= 0$, or ∞; the roots of which equations will give thoſe values of y, or of B F, that anſwer to ſo many different points of contrary flexure. In general the number of roots in the finite equation always indicate the number of points of inflection or retrogreſſion belonging to the curve which is the ſubject of inveſtigation; and conſequently, in thoſe curves that have but one ſuch point, it is determined by a ſimple equation.

Curves may alſo have another kind of retrogreſſion different from that we have been conſidering; which is, when the curve returns backwards towards its origin, turning its cavity the ſame way that it did before its retrogreſſion, as in the following caſe.

Let the curve be B A C (*fig.* 7.), with a contrary flexure at A, and let it be evolved by a thread beginning at any point D, different from the point of contrary flexure A: the evolution of the portion D C generates the curve D G, and that of the portion A B generates the curve E F; in ſuch manner that the evolution of the whole curve B A C will form the entire curve F E D G, which has two retrogreſſions, one at D of the uſual form, becauſe the two branches D E, D G, turn their convexity; the other at E of the ſecond ſort, becauſe the branches E D, E F, are concave towards the ſame parts. Let now m N, N n m, be any two radii, indefinitely near, of the evolute D A; and N H, and n H, two perpendiculars to the ſame; the two indefinitely ſmall ſectors N m M, H N n, will be ſimilar, and therefore H N : N M :: N n : M m. But in the point of contrary flexure A, the radius H N ought to be either infinite, or nothing; and the radius N m, which becomes A E, continues finite. Therefore, in the caſe of contrary flexure A, that is, the point of retrogreſſion E, of the ſecond ſort, the ratio of N n, M m, or the ratio of the fluxion of the radius M N, to the element of the curve, ought to be either infinitely great, or infinitely ſmall. But the formula of the radius M N is $\frac{(\dot{x}^{2} + \dot{y}^{2})^{\frac{3}{2}}}{- \dot{x} \ddot{y}}$, conſidering $\dot{x}$ as conſtant; the fluxion of which is

$$\frac{- 3 \dot{x} \dot{y} \ddot{y}^{2} \sqrt{(\dot{x}^{2} + \dot{y}^{2})} + \dot{x} \dddot{y} (\dot{x}^{2} + \dot{y}^{2})^{\frac{3}{2}}}{\dot{x}^{2} \ddot{y}^{2}}$$

and M $m = \sqrt{(\dot{x}^{2} + \dot{y}^{2})}$; therefore $\frac{\text{N } n}{\text{M } m} =$

$$\frac{\dot{x}^{2} \dddot{y} + \dot{y}^{2} \dddot{y} - 3 \dot{y} \ddot{y}^{2}}{\dot{x} \ddot{y}^{2}} = 0, \text{ or } \infty;$$

which is the formula for points of retrogreſſion of the ſecond order.

For other methods of finding the points of inflection and retrogreſſion of curves, the reader is referred to Simpſon's and Maclaurin's Fluxions; Donna Agneſi's Analytical Inſtitutes; and to the Traité Elementaire de Calcul Differentiel, par La Croix.

INFLORESCENCE, in *Botanical Phraſeology*, *infloreſcentia* of Linnæus, is uſed to expreſs the particular manner in which flowers are diſpoſed upon a plant, and which preceding writers denominated the *modus florendi*, or "manner of flowering." The ſeveral kinds of infloreſcence come under the heads of *Verticillus*, *Racemus*, *Spica*, *Corymbus*, *Faſciculus*, *Capitulum*, *Umbella*, *Cyma*, *Panicula* and *Thyrſus*, which the reader will find in their proper places. A ſlight correction of the definition which ſtands under our article CAPITULUM is neceſſary, the *Statice Armeria* or Thrift, and *Gomphrena globoſa* or Globe amaranthus, being better examples of that kind of infloreſcence than any compound flower.

For the reaſons againſt taking generic characters from the infloreſcence, ſee CYME and GENUS.

INFLUENCE, a quality ſuppoſed to flow from the bodies of the ſtars, either with their heat or light, to which aſtrologers vainly attribute all the events which happen on the earth.

Alchemiſts, alſo, who to this aſcribe the philoſopher's ſtone, tell us that every thing in nature is produced by the influences of the ſtars, which, in their paſſage through the atmoſphere, imbibe many of its moiſt parts, the groſſeſt whereof they depoſit in the ſands and earths where they fall; that theſe, filtrating through the pores of the earth, deſcend even to the centre, whence they are driven, by the central fire, back again to the ſurface; and in their aſcent, by a natural kind of ſublimation, as they find earths duly diſpoſed, they form natural bodies, as metals, minerals and vegetables, &c. Thus it is pretended, that chemiſtry, conſiſting of an artificial imitation of theſe natural operations, and in applying active principles to paſſive principles, can form natural bodies, make gold, &c. See TRANSMUTATION, and PHILOSOPHER'S STONE.

INFLUENT, a term uſed where a liquor or juice, by the contrivance of nature, and the laws of circulation, falls into a current or receptacle.

Thus with reſpect to the common receptacle, the chyle is its influent juice; and ſo is the bile to the gall-bladder; the venal blood to the heart in its diaſtole; and the like.

INFLUENZA, in *Medicine*, a term generally employed to denote an *epidemic catarrh*, which has at different times ſpread more rapidly and extenſively than any other epidemic diſorder. For it has ſeldom occurred in any one country of Europe without appearing ſucceſſively in every other part of it; it has ſometimes apparently traverſed the whole of the old world; and, in ſome inſtances, it has been even transferred to America, and has ſpread itſelf over that continent likewiſe. The French give it the name of *La Grippe*.

In truth, this extenſive prevalence of the diſeaſe conſtitutes its moſt remarkable peculiarity: for in all the inſtances of its occurrence, from the fourteenth century down to the preſent day, its phenomena have not only been pretty uniformly the ſame, but have differed little, except in ſeverity, from thoſe of the common febrile catarrh. (See CATARRH.) This will appear from the following deſcription of the diſeaſe, when epidemic in 1782, which is taken from a comprehenſive view of it, compiled by the late Dr. Gray, of the Britiſh Muſeum, from a number of accounts given by phyſicians, in various parts of Great Britain, from their own perſonal obſervation (ſee Medical Communications, vol. i. art. 1. Lond. 1784); and from a ſimilar account publiſhed by the College of Phyſicians. Med. Tranſactions, vol. iii. art. 8.

Very little authentic information was procured reſpecting the hiſtory of this epidemic, before the time of its appearance in London: all that was ſtated, on good authority, was, that it prevailed at Moſcow in the months of December 1781, and January 1782, and at Peterſburgh in February 1782; and it was traced to Tobolſki, to which place it was ſuppoſed to have been brought from China. In confirmation of this opinion it was obſerved, that ſeveral accounts from different parts of the Eaſt Indies made mention of a diſorder, ſimilar in its ſymptoms, which prevailed in thoſe parts in the months of October and November 1781. At all events, its courſe was in the beginning weſtward; for it was in Denmark in the latter end of April 1782, or the beginning of May; and many people were ſaid to have died of it at Copenhagen before the 11th of May. It appeared at Newcaſtle-upon-Tyne about the end of April, and in the ſecond week in May it was certainly in London; ſome perſons indeed thought that it had reached the metropolis ſooner. According to the accounts received from various parts of England, it did not begin to appear in moſt of them until after its prevalence in London, namely, until the latter end of May, or the beginning of June. In Scotland and Ireland it ſeems to have been rather later, and in the ſouth of Europe later ſtill; for it prevailed in France in the months of June and July; in Italy, in July and Auguſt; and in Portugal and Spain, in Auguſt and September. The fourth week in May was the period of its moſt general prevalence in London: from that time it began to decline, and in the ſpace of two or three weeks ceaſed to exiſt as a general diſorder; but it did not altogether leave the city till the month of September.

No attempt was made to aſcertain with accuracy the proportional number of perſons attacked by this influenza: the number was every where very great; the proportion of the inhabitants affected in ſome places being eſtimated at three-fourths, in other places at four-fifths of the whole: and in London it was aſſerted, from a pretty competent view of the matter, that the number of thoſe attacked by it was much greater than that of thoſe who eſcaped it. Both ſexes appeared to be equally liable to it; but perſons of the middle age were more ſubject to its attacks than old people, and theſe more than children; while infants were conſiderably leſs pre-diſpoſed to it than either, though not entirely exempt from it. When old perſons were attacked, they generally had the diſeaſe very violently.

This epidemic appeared with a conſiderable variety of ſymptoms; but the moſt general form of it was certainly that of catarrh; and the great debility or depreſſion of ſtrength which accompanied its attack, and the rapidity with which its ſymptoms came on, (which in ſome inſtances was truly wonderful,) ſeem to have been the moſt remarkable characters of it. Perſons, apparently in perfect health, were ſeized inſtantaneouſly, as it were, with a violent cold, to which ſucceeded head-ache, running at the noſe, &c.; while others were as ſuddenly ſeized with giddineſs, ſtricture on the cheſt, ſickneſs at the ſtomach, and cold ſweats, which were ſpeedily followed by the pectoral ſymptoms. The moſt common courſe of the ſymptoms, however, was the following:

The diſeaſe generally began with ſits of chillineſs and heat alternately ſucceeding each other; ſometimes with a ſlight ſhivering, followed by more or leſs of fever; anxiety of the præcordia; pain in the back and limbs; ſtitches and cramps in the muſcles ſubſervient to reſpiration; a very great diſcharge of their lymph from the eyes and noſe; a ſenſation in the eyes as if they were about to ſtart out of the head; ſneezing, hoarſeneſs, and frequently an inceſſant cough, forcing up large quantities of mucus, and ſometimes attended with a ſoreneſs of the breaſt. In many inſtances the appetite and ſenſe of taſte were loſt or much impaired, with ſome degree of nauſea; and a few vomited. Moſt of the patients laboured under great laſſitude and reſtleſsneſs. The ſleep was generally much broken; and many could hardly ſleep at all. The pulſe was frequent, but ſeldom hard or tenſe. Languor, debility, and dejection of ſpirits were general, and very great in all; far beyond what might have been expected from the degree of all the other ſymptoms. But the ſymptom which univerſally prevailed, and which appeared to be almoſt a pathognomonic of the diſeaſe, was a diſtreſſing pain and ſenſe of conſtriction in the forehead, temples, and ſometimes in the whole face, accompanied with a ſenſe of ſoreneſs about the cheek-bones under the muſcles. This, now and then, was felt previouſly to the catarrh, and not unfrequently was followed by very little or no catarrhous affection.

The diſtemper was by no means ſo uniform as to preſent the ſame identical appearances in every ſubject whom it attacked; nor yet ſo various, but that the reſemblance could eaſily be diſcovered; diverſified perhaps by the peculiar habit and conſtitution of the ſufferer, or by ſome other circumſtances not eaſily explained. In ſome, a part only of the mucous membrane was affected, in others the whole. In the latter, a ſoreneſs of the throat was common, with frequent excretion. Upon inſpecting the *fauces* of theſe, a redneſs might be obſerved; but in few inſtances any conſiderable ſwelling, and in none any ulceration. In ſome there was a great propenſity to perſpiration; it could be readily excited in moſt, and often appeared where no means had been employed for that purpoſe; but in a few the ſkin was dry throughout the whole complaint. Daily exacerbations and remiſſions of the cough and fever were obvious in many inſtances; in ſome, they either did not take place, or if they did, were very obſcure. The ſtate of the belly was very different in different patients; in ſome it was regular, in others diſpoſed to coſtiveneſs; which, however, was eaſily removed: and ſeveral had a ſpontaneous purging at various periods of the diſeaſe, ſometimes with pain, but oftener without. Nothing in general could be collected from the urine that deſerves notice.

Theſe were the moſt general and frequent appearances of the influenza of 1782. But it muſt be obſerved, that not only in London, but in all parts of the iſland from whence accounts were received, it now and then degenerated into pleuriſy or peripneumony; yet theſe affections ſtill manifeſted themſelves as particular modifications of the epidemic, being either preceded or accompanied by ſome of its characteriſtic ſymptoms. Some, thus attacked, had in the beginning either that diſtinguiſhing pain in the face and forehead, or catarrh, or both: and in all there was that debility of body and depreſſion of mind, which are not eſſential to inflammation; the preſence of which here, however, was obvious and indiſputable.

The rarer occurrences were in ſome few an unuſual diſpoſition to ſleep; in others, ſtrangury independent of bliſters, and in ſome inſtances attended with bloody urine for three or four days; hæmorrhages from the noſe, with relief to the catarrhal affections; and one inſtance of a clear diſcharge from the ears, as copious as others had it from the noſe.

Extenſive as the range of this epidemic was, its influence was neither very fatally exerted, nor long continued. Very few died of it; and of thoſe to whom it proved fatal, the greater part were old, aſthmatic, or had been debilitated by ſome previous indiſpoſition. The continuance of the diſtemper in any one place was not above ſix weeks: where it appeared in May, it vaniſhed before the end of June; and where it did not break out before June, it remained until the middle, or towards the decline of July. Its duration with each individual whom it attacked was as various as the degree of violence with which the attack was made. It ſeldom held any one above a fortnight; in ſome its duration was not above a day or two; but it uſually laſted about a week, or longer. In ſome parts of the country relapſes were common a ſecond, third, or even fourth time; this was alſo the caſe in London, but to a leſs extent. The cough was ſometimes troubleſome for a conſiderable time after the febrile ſtate of the diſorder had ceaſed; and a great weakneſs often remained after the diſeaſe.

The influenza, as above deſcribed, may be taken as an example of the epidemic at all times of its appearance; but it has ſometimes aſſumed a more violent and inflammatory type, been more frequently accompanied with ſymptoms of pleuriſy and peripneumony, and therefore more frequently fatal, and alſo laid the foundation for more numerous caſes of pulmonary conſumption, than in the inſtance of 1782. Such was the fact, in regard to the influenza of 1762 in particular; which, indeed, appeared to be far more fatal, both at the time of its raging, and in its conſequences, as ſeveral perſons continued languiſhing under the remains of it for one or two years, and never recovered.

The cauſes of the influenza have been the ſubject of much difference of opinion; and all that has been ſaid in reſpect to them rather tends to prove the difficulty of obtaining a ſufficient number of unqueſtionable facts to found a clear opinion upon, than to ſet the ſubject at reſt. Three different views of the matter have been taken by different phyſicians: 1. Some attributed the diſeaſe ſolely to the ſtate of the weather; *i. e.* they believed it to be a common catarrh, occaſioned by changes in the ſenſible qualities of the atmoſphere, ſuch as cold, moiſture, &c.: 2. Others aſcribed it to a particular and ſpecific morbid principle, totally different from and independent of the ſenſible qualities of the atmoſphere, but reſident in and conveyed by the air: 3. While the greateſt number concurred in the opinion, that the influenza was contagious, in the ordinary acceptation of the word, *i. e.* was propagated only by the contact, or at leaſt by the ſufficiently near approach, of an infected perſon. The *firſt* opinion, however, that it originated in the ſenſible variations of the air, ſeems to be untenable: for not only was there no peculiarity of the atmoſpherical temperature, moiſture, &c., which was common to the different periods when the influenza prevailed, or was obviouſly different from that of other ſeaſons, when it had not appeared; but the ſenſible ſtate of the air preceding and accompanying the ſame epidemic was different in different places. Thus, though in moſt parts of England it had been uncommonly cold and wet, yet in the other parts of the world, as in Germany, where the diſorder was equally general, it had been very dry. Again, it was obſerved in ſeveral places, that great alterations happened in the weather during its prevalence, without any ſenſible change in the ſymptoms of the diſorder.

The *ſecond* opinion, that the cauſe of the diſeaſe, though not connected with the ſenſible qualities of the atmoſphere, was yet reſident in it, and thus conveyed from place to place, was ſupported upon the following grounds: 1ſt. That thoſe who were moſt expoſed to the air were generally the firſt perſons attacked: 2dly. That many had the diſorder without having had any communication with a diſeaſed perſon: 3dly. That ſeveral eſcaped though ſurrounded by perſons ill of the diſeaſe: 4thly. That ſome *whole families* were ſeized *at once*: and, 5thly. That ſome perſons had the diſorder a week or a fortnight before it began to be taken notice of as a general one. Without preſuming to decide upon ſo difficult and intricate a queſtion, we may ſtate the following objections to theſe arguments.

The firſt argument, that thoſe who were moſt expoſed to the air were generally the firſt perſons attacked, (which, by the way, was altogether denied by many obſervers,) is ſurely by no means in favour of the opinion, that the cauſe of the diſorder reſided in the atmoſphere; for if it had reſided there, what ſhould have prevented thoſe who ſtaid at home from being infected? ſince the air which they breathed muſt neceſſarily have been the ſame as that breathed by thoſe who went out. But if, on the other hand, a communication with ſome infected perſon was neceſſary to produce the diſtemper, it is very clear that thoſe who went out of doors, and mixed with the world, were more likely to get it than thoſe who did not ſtir from home.

Before the ſecond argument, namely, that many were attacked without having had any communication with a diſeaſed perſon, can be allowed to have any weight, it muſt be clearly proved, not only that the perſons themſelves had not had ſuch communication, but alſo, that no perſon, who had been near them, had previouſly been where the diſorder exiſted: for it is pretty clearly eſtabliſhed, with reſpect to other active contagions, ſuch as the ſmall-pox, &c. that a perſon, who has already ſuffered the diſeaſe, may nevertheleſs convey the contagion from one place to another.

From the third argument, that many eſcaped though ſurrounded by perſons affected with the diſeaſe, no inference of any conſequence to the preſent queſtion can be drawn; it being certainly not leſs difficult to account for their eſcape when ſurrounded by diſeaſed perſons, than when ſurrounded by the ſame air, which had (according to the hypotheſis) cauſed the diſeaſe in thoſe perſons.

With reſpect to the fourth argument, that ſome *whole families* were ſeized *at once*, without having been expoſed to infection, it may be remarked that, when we conſider what has been ſaid in anſwer to the ſecond argument, it will be very difficult to prove that they were not expoſed to it; and equally difficult to give any reaſons why, if the exciting cauſe of the diſorder reſided in the air, any whole family ſhould have been affected by that cauſe, rather than an equal number of perſons in divers families; but if we ſuppoſe the diſeaſe to have been propagated by perſonal intercourſe, it is very eaſy to conceive in what manner it may have been communicated to ſome whole families at the ſame time. And, in anſwer to the laſt argument, that ſome perſons had the diſorder a week or a fortnight before any others were known to have it, it may be ſufficient to remark, that, admitting theſe caſes to have been really influenza, the ſuppoſition, that the cauſe of it exiſted in the air, will not render it more eaſy to explain why thoſe perſons only ſhould at that time have been affected by this cauſe.

Theſe conſiderations tend to favour the *third* opinion above-mentioned, that the diſeaſe was propagated by contagion, in the common acceptation of the term, that is, by perſonal communication with the diſeaſed; but they are very far from being deciſive of the queſtion. Indeed, the queſtion of contagion, as connected with any particular epidemic, in which there is no palpable matter produced, by which the diſeaſe can be communicated, is always difficult, and has been agitated even with regard to the plague itſelf. (See CONTAGION and EPIDEMIC.) But it has been ſatisfactorily demonſtrated, that the contagion of all malignant and eruptive fevers cannot be conveyed through the air to any diſtance (even many feet) from its ſource. If the contagion of the influenza, therefore, could be ſuſpended and conveyed through the atmoſpheric air, ſo as to ſpread the diſeaſe far and wide, it would form an exception to the general properties of known contagions. Several facts, recorded during the epidemic of 1782, militate ſtrongly againſt ſuch a ſuppoſition. It was remarked, for example, that the diſeaſe was prevalent in one place a week or two before it appeared in another, only a few miles diſtant from the firſt. Thus it ſhewed itſelf at Edinburgh on the 20th of May, and ſoon raged very much, and was prevalent at Glaſgow in the firſt week in June; yet it did not appear at Muſſelburgh, a village about five miles ſouth-eaſt of Edinburgh, until the 9th or 10th of June. Again, it was prevalent at Dartmouth much ſooner than at Exeter, and yet it appeared at Exeter much ſooner than at Tinmouth, although the laſt mentioned place is ſituated between Dartmouth and Exeter.

The opinion, that it was propagated by perſonal intercourſe, was alſo favoured by its progreſs in numerous inſtances. Thus it was frequently obſerved, that ſome one individual in a family was firſt attacked, and that then ſeveral more, and ſometimes the whole of the ſame family, were very ſoon afterwards ſeized with it, in ſome inſtances all at once, but in others ſucceſſively. Very early in June, three families, conſiſting of ſeventeen perſons, came on the ſame day to the hotel in the Adelphi buildings; they were all in perfect health when they arrived; and they were all affected the next day with the ſymptoms of the illneſs then reigning in London. In ſome caſes, it ſeemed to be propagated, like contagious diſeaſes in general, by *fomites*, that is, by articles of clothing or furniture impregnated with the morbific effluvia. One phyſician, Dr. Meaſe of Strabane, in Ireland, ſays, "I have no ſhadow of doubt that the diſorder was contagious; and am certain, I myſelf received the infection from a ſmall trunk of wearing apparel, which came from Dublin, where it then raged. I may add, that this was the firſt introduction of it into this town." The diſeaſe appeared to be carried on board two ſhips of war, on their arrival at Graveſend from the Weſt Indies, by three cuſtom-houſe officers, who were put on board: in a few hours after, the crews of both ſhips, till then in good health, were ſeized with ſymptoms of the influenza; hardly a man in either ſhip eſcaped, and ſome had it very ſeverely. In ſome inſtances it was obſerved, that the epidemic did not ſhew itſelf in certain places, until ſome one or more arrived at thoſe places, either actually labouring under the diſeaſe, or coming immediately from other places, whoſe inhabitants had been affected by it for ſome days. In general the diſeaſe appeared earlier in towns, than it did in the ſurrounding villages, and in villages earlier than in the detached houſes in the neighbourhood.

On the whole, the progreſs of the diſorder is perhaps more eaſily explained, upon the ſuppoſition that it was propagated by perſonal communication, than by any other. In objection to this hypotheſis, however, it is credibly affirmed, that the crews of ſeveral ſhips were ſeized with the influenza many miles diſtant from land, and came into various ports of England labouring under it; and the ſame thing is ſaid to have happened to ſhips in the Eaſt Indies, and other parts. But great caution is requiſite in admitting ſuch ſtatements as facts, from which any ſatisfactory inferences can be deduced.

A ſimilar epidemic catarrh, or influenza, is recorded as having viſited Europe, and even other parts of the globe, two or three times in the fourteenth century, and at ſeveral ſubſequent periods; namely, in the year 1510, 1575, and 1580, the laſt of which is ſaid to have originated, like ſeveral of thoſe which ſucceeded, in Aſia; and again in 1591, in 1658, in 1675, in 1709, in the latter end of 1732, and in the beginning of 1733, in 1743, in 1748, in 1762, in 1767, in 1775, in 1782, and in 1803. Thoſe who are deſirous of inveſtigating the records of theſe epidemics, will find references to the works in which they are contained, arranged in chronological order, in Dr. Cullen's Synopſis Noſologiæ Method. under the head of Catarrhus, Gen. xl. and ſpecies 2. C. *à contagio.*

Cure of the Influenza.—Since the effects of this diſeaſe were different in different individuals, no general method of cure could rationally be followed. Many, indeed, were ſo ſlightly indiſpoſed, as to require but little or no medicine. Nothing more was wanted for their cure, than to abſtain for two or three days from animal food and fermented liquors, and to uſe ſome diluting tepid drink. A lenient purgative, given at the beginning of the diſeaſe, was uſeful in moderating the fever; and nature ſometimes ſeemed to point out the repetition of it afterwards, when there were pains in the ſtomach and bowels, and a tendency to a diarrhœa. The ſame was obſerved in the epidemics of 1732 and 1762. Nothing likewiſe was obſerved ſo ſucceſsfully to mitigate the cough, as to open the bowels with a gentle purgative, and afterwards to give a ſlight opiate at night. It was obſerved by numerous practitioners, that emetics, exhibited upon the firſt attack, were evidently of uſe in relieving the head and breaſt, and alſo in producing a ſpeedy and free perſpiration. All attempts to force much ſweating appeared to do harm, eſpecially by means of the ſtimulating diaphoretics, ſuch as contrayerva, ammonia, wine whey, &c. In fact, in moſt of the mild and ſimpler forms of the diſeaſe, an early perſpiration generally came on ſpontaneouſly, which ſeldom failed to relieve the ſymptoms materially, and it was only neceſſary to give tepid aqueous liquors, the neutral ſalts, or antimonials in ſmall doſes, to keep up a regular and gentle moiſture upon the ſkin.

But in the more ſevere forms of the diſorder, other remedies became neceſſary, according to the ſeverity of the ſymptoms. Whenever ſymptoms of pleuriſy or peripneumony appeared, the propriety of blood-letting was commonly admitted, notwithſtanding the languor and depreſſion connected with the diſeaſe. There was, however, conſiderable difference of opinion upon the ſubject of blood-letting. Several learned and experienced phyſicians, if called at the beginning of the diſeaſe to a perſon ſtrong and plethoric, and labouring under great heat and inquietude, even in caſes where no direct ſymptoms of pneumonic inflammation appeared, ordered bleeding without heſitation; and under ſuch circumſtances, they ſeveral times obſerved, that the languor, oppreſſion, and feveriſh anxiety, were abated by the loſs of a few ounces of blood; that both the head and the breaſt were relieved; and that the diſeaſe proceeded to its termination with fewer difficulties both to the patients and to themſelves, and without any ſubſequent inconvenience. Yet others were of opinion that the blood-letting, although indicated by the ſymptoms, and alſo by the appearance of the blood drawn, not only failed to procure that relief, which might have been expected from it under ordinary catarrhal or pneumonic ſymptoms, but in ſome caſes even proved prejudicial. Bliſters were applied to various parts with good effects: when there was pain in the breaſt or ſide, the application of them to the part affected was found very beneficial; and it was frequently thought proper to keep them open for ſome time. In ſome caſes, it was remarked, that a ſecond bliſter, applied a few days after the firſt, produced great relief, when the firſt had failed to do ſo. On account of the great debility, which ſeldom failed to accompany or follow the diſorder, bark and cordials were often deemed neceſſary, eſpecially towards the cloſe of the diſeaſe; but they would probably be deemed leſs neceſſary by the practitioners of the preſent day; for when a diſeaſed condition is removed, the conſtitution commonly recovers its ſtrength with rapidity, when care is taken the food be light and nutritious, and there is a free acceſs to pure air. See Medical Tranſact. vol. iii. art. 8.—Medical Communications, vol. i. art. 1.—Hiſt. de la Soc.

Royale de Med. de Paris, pout 1776.—Edin. Med. Eſſays, vol. ii. art. 2.—Rutty, Hiſt. of Weather.

INFORCED. } See { REINFORCED.
INFORCEMENT. } { REINFORCEMENT.

IN FORMA PAUPERIS, in *Law*. See FORMA *Pauperis*.

INFORMATION, for the king, is much the ſame with what is called declaration for a common perſon: it is not always done directly by the king or his attorney, or the clerk of the crown-office; but ſometimes by another, who ſues as well for the king as himſelf, on a breach of ſome penal law or ſtatute, wherein a penalty is given, one part to the uſe of the king, and another to the uſe of the informer. And it differs from an indictment, which is found by the oaths of twelve men; and is only the allegation of the officer who exhibits it. The latter ſort of informations, which are partly at the ſuit of the king, and partly at that of a ſubject, is a ſpecies of *qui tam* actions, ſo called becauſe they are brought by a perſon *qui tam pro domino rege*, &c. *quam pro ſeipſo in hac parte ſequitur*, and carried on by a criminal inſtead of a civil proceſs. By 31 Eliz. c. 5, no proſecution of this kind can be brought by any common informer, after one year is expired ſince the commiſſion of the offence; nor out of the country where the offence was committed; nor on behalf of the crown after the lapſe of two years longer; nor, where the forfeiture is originally given to the king alone, can ſuch proſecution be had after the expiration of two years from the commiſſion of the offence. It is alſo enacted by 18 Eliz. c. 5, that if any perſon, informing under pretence of any penal law, makes any compoſition without leave of the court, or takes any money or promiſe from the defendant to excuſe him, he ſhall forfeit ten pounds, ſtand two hours on the pillory, and be for ever diſabled to ſue on any popular or penal ſtatute. And by the ſame ſtatute, if a perſon exhibits his information only for vexation, the defendant may bring information againſt the informer. See COMPOUNDING *of Informations*.

Informations that are exhibited in the name of the king alone are of two kinds; thoſe which are truly and properly his own ſuits, and filed *ex officio* by his own immediate officer, the attorney-general; and thoſe, in which, though the king is the nominal proſecutor, yet it is at the relation of ſome private perſon or common informer; and they are filed by the king's coroner and attorney in the court of king's bench, uſually called the maſter of the crown-office, who, for this purpoſe, is the ſtanding officer of the public. The objects of the king's own proſecutions, filed *ex officio* by his own attorney-general, are properly ſuch enormous miſdemeanors as particularly tend to diſturb or endanger his government, or to moleſt or affront him in the regular diſcharge of his royal functions. The objects of the other ſpecies of information are any groſs and notorious miſdemeanors, riots, batteries, libels, and other immoralities of an atrocious kind. And when an information is filed in either of theſe ways, it muſt be tried by a petit jury of the county where the offence ariſes; after which, if the defendant be found guilty, he muſt be reſorted to the court for his puniſhment. Theſe informations, which are as ancient as the law itſelf (1 Show. 118.), of every kind, are confined by the conſtitutional law to mere miſdemeanors only, without extending to any capital offence. The oppreſſive uſe of information by the court of Star-chamber, &c. in the times preceding the Revolution, occaſioned a ſtruggle ſoon after the acceſſion of king William, to procure a declaration of their illegality by the judgment of the court of king's bench. But ſir John Holt, who then preſided there, and all the judges, were clearly of opinion, that this proceeding was founded on the common law, and could not then be impeached. However, in a few years afterwards, it was enacted by 4 & 5 W. & M. c. 18. that the clerk of the crown ſhall not file any information without expreſs direction from the court of king's bench; and that every proſecutor, permitted to promote ſuch information, ſhall give ſecurity by a recognizance of twenty pounds (a ſum now too ſmall), to proſecute the ſame with effect; and to pay coſts to the defendant, in caſe of his acquittal, unleſs the judge, who tries the information, ſhall certify there was reaſonable cauſe for filing it: and, at all events, to pay coſts, unleſs the information ſhall be tried within a year after iſſue joined. But there is a proviſo in this act, that it ſhall not extend to any other informations than thoſe which are exhibited by the maſter of the crown office: and, conſequently, informations at the king's own ſuit, filed by his attorney-general, are no way reſtrained thereby.

There is one ſpecies of informations, ſtill farther regulated by 9 Ann. c. 20, *viz.* thoſe in the nature of a writ of *quo warranto*, which is a remedy given to the crown againſt ſuch as had uſurped or intruded into any office or franchiſe. The modern information tends to the ſame purpoſe as the ancient writ, being generally made uſe of to try the civil rights of ſuch franchiſes; though it is commenced in the ſame manner as other informations are, by leave of the court, or at the will of the attorney-general; being properly a criminal proſecution, in order to fine the defendant for his uſurpation, as well as to ouſt him from his office; yet uſually conſidered at preſent as merely a civil proceeding.

An information on behalf of the crown, filed in the exchequer by the king's attorney-general, is a method of ſuit for recovering money or other chattels, or for obtaining ſatisfaction for damages in any perſonal wrong committed in the lands or poſſeſſions of the crown. (Moor, 375.) The moſt uſual informations are thoſe of *intruſion* and *debt*; the former being for any treſpaſs committed on the lands of the crown (Cro. Jac. 212. 1 Leon. 48. Savil. 49.), as by entering thereon without title, holding over after a leaſe is determined, taking the profits, cutting down timber, or the like; and the latter, upon any contract for monies due to the king, or for any forfeiture due to the crown upon the breach of a penal ſtatute. There is alſo an information *in rem*, uſually filed in the exchequer, where any goods are ſuppoſed to become the property of the crown, if no man appears to claim them, or to diſpute the title of the king. There is alſo another information, filed *ex officio* by the attorney-general, in the court of chancery, at the relation of ſome informant, called the relator, for the proper eſtabliſhment of charities, of which the king has the general ſuperintendance. Blackſt. Com. b. iii. and iv.

INFORMATUS NON SUM, or *Non ſum informatus*, a formal anſwer made of courſe by an attorney, who is commanded by the court to ſay any thing he thinks good in behalf of his client: who having nothing material to urge, makes anſwer, he is not informed: on which judgment paſſes for the other party.

INFORMER, INFORMATOR, a perſon that informs againſt, or proſecutes in any of the king's courts, thoſe that offend againſt any law or penal ſtatute. See INFORMATION.

INFORMIS, UNFORMED, that which has not the form or perfection it ſhould have.

INFORMES *Stellæ*, in *Aſtronomy*, are ſuch ſtars as have not yet been reduced into any conſtellation: otherwiſe called *ſporades*.

Of this kind there was a great number left by the ancient aſtronomers; but Hevelius, and ſome others of the moderns, have provided for the greater part of them, by making new conſtellations.

INFORTUNIUM, Homicide by. See Homicide.

INFRA, *Lat. below.* See Hypo.

INFRACTION, formed from *in* and the ſupine of *frango, I break*, a rupture or violation of a treaty, law, ordinance, or the like.

INFRALAPSARII, in *Eccleſiaſtical Hiſtory*, the name of a ſect of Predeſtinarians, who maintain, that God has created a certain number of men only to be damned, without allowing them the means neceſſary to ſave themſelves, if they would; and they are thus called, becauſe they hold that God's decrees were formed *infra lapſum*, after his knowledge of the fall, and in conſequence thereof; in contradiſtinction to the Supralapſarians.

INFRASCAPULARIS, in *Anatomy*, a name of the infraſpinatus muſcle. See the following article.

INFRASPINATUS, is a muſcle of the ſhoulder, called by the French ſous-epineux, and ſous-ſcapulo-trochitérien. It is placed at the back of the ſhoulder, covering that diviſion of the dorſum of the ſcapula which is below the ſpine, and extends from the baſis of the ſcapula to the great tubercle of the humerus. It is thick, broad, and triangular.

Its poſterior ſurface is covered above and on the outſide by the deltoid; above and within by the trapezius, and below by the latiſſimus dorſi: in the reſt of this ſurface it is covered by the ſkin. A thin aponeuroſis, common to this muſcle and the teres minor, immediately inveſts its poſterior ſurface. This aponeuroſis is continuous above with thoſe of the trapezius and deltoid, it is attached on the inſide to the baſis of the ſcapula; is continuous below, with a ſeptum placed between the two teres muſcles and the infraſpinatus; and is fixed on the outſide to the poſterior edge of the inferior margin of the ſcapula.

Its anterior ſurface covers the ſcapula below the ſpine, to the poſterior three-fourths of which it is attached. It is ſeparated from the anterior fourth of this lower diviſion of the ſcapula by the ſuperior and external ſcapular veſſels, by the ſcapular nerve, and by cellular ſubſtance. Beyond the ſcapula this ſurface of the muſcle covers the ſhoulder joint, to the orbicular ligament of which it is ſtrongly connected. The inner edge is fixed to the baſis of the ſcapula, from the ſpine almoſt to the inferior angle. Its upper edge is attached to the lower ſurface of the ſpine of the ſcapula, and to the aponeuroſis of the deltoid: the outer portion of this margin is parallel to the inferior edge of the ſupraſpinatus. The lower border is oblique from below upwards, and from within outwards. This is united to the teres major by an aponeurotic ſeptum, which is ſoon divided into two layers: one of theſe paſſes between the two teres muſcles, the other between the teres minor and infraſpinatus. The lower border of the latter is then united to the teres minor through about half its length; for the reſt of their extent they are ſeparated by a cellular line. In many ſubjects the fibres of theſe two muſcles are ſo confounded at this part, that they cannot be ſeparated.

The ſuperior and inferior edges are united at a truncated angle, which is large and thick, and attached to the middle of the great tubercle of the humerus.

The infraſpinatus muſcle is compoſed of tendinous and muſcular parts. It is attached to the humerus by a broad and thick tendon, which expands into an aponeurotic plane continued into the ſubſtance of the muſcle beyond its middle, and nearer to the poſterior than to the anterior ſurface of the muſcle. The muſcular fibres ariſe from the dorſum of the ſcapula, from the under ſurface of its ſpine, from the aponeuroſis of the deltoid, and from the aponeurotic ſeptum, which ſeparates this from the two teres muſcles. They join the common tendon, which they accompany nearly to the humerus, purſuing, however, very different directions. The ſuperior fibres proceed nearly horizontally from within outwards: all the others are oblique from within outwards, and from below upwards, and their obliquity increaſes as they are placed lower down. Thoſe fibres, which ariſe from the aponeuroſis of the deltoid, and from the lower ſurface of the ſpine of the ſcapula, deſcend ſlightly, and terminate on the poſterior ſurface of the tendon, on which they are extended almoſt to its attachment to the humerus.

The motions which this muſcle can produce in the humerus, differ according to the poſition of that bone. When the arm is hanging by the ſide, the humerus will be moved on its axis, ſo as to be turned from before outwards and backwards. If the humerus has been previouſly elevated, the infraſpinatus will carry it backwards. When the arm is fixed, this muſcle will draw the ſcapula, and through it the trunk alſo, forwards. The ſtrength and breadth of its tendon enable it to ſupport the head of the humerus, and to prevent it from being thrown out of the glenoid cavity, when the arm is moved ſuddenly forwards.

INFULA, a name anciently given to one of the pontifical ornaments worn on the head. Feſtus tells us that the infulæ were filaments or fringes of wool, covering that part of the head where the hair grows as far as the temples, whence, on each ſide, hung down two ſtrings called *vittæ*, for binding it, wherewith the ancients uſed to adorn their prieſts, their victims, and even their temples. The infula was the ſame thing to prieſts that the diadem was to kings; *viz.* the badge of their dignity and authority. The difference in ſhape between the diadem and the infula conſiſted in this, that the diadem was flat and broad, and the infula was rounded and twiſted.

INFUMA, or Dikjeschoft, in *Geography*, a town of Africa, in the kingdom of Anté, where the Engliſh built a fort in 1691.

INFUNDIBULA *of Birds.* See *Anatomy of* Birds.

INFUNDIBULIFORM Flowers, in *Botany*, are ſuch as reſemble the figure of a funnel; being broad and ample at top, and contracted into a neck at bottom; ſuch as that of the bear's ear, or auricula.

INFUNDIBULUM, a Latin word ſignifying a *funnel*; whence divers parts in the human body, having a reſemblance thereto in ſhape, are called by the ſame name.

Hence alſo certain parts of plants are called *infundibuliformes*.

The word infundibulum is alſo uſed by the metallurgic writers to ſignify a veſſel of a conic ſhape, uſed to pour a melted metal out of the crucible into.

Infundibulum, in *Anatomy*, a ſmall proceſs in the brain. See Brain.

INFUSION, in *Pharmacy*, an operation whereby the virtues of plants, roots, and the like are drawn out by letting them ſteep in ſome convenient fluid menſtruum without boiling them therein; ſince boiling is found to diſſipate the finer parts of many bitter and aromatic ſubſtances, without carefully extracting their medicinal principles.

Infuſion is uſed in bodies of a lax texture, whoſe parts are ſo light as not to admit of a greater motion without hazard of flying away in vapour.

Its chief uſe is to communicate the virtues of bodies to liquors, either in order to regulate their force, or correct their ill qualities.

Some infuſions are made in common water, others in wine, vinegar, milk, ſpirit of wine, &c. Boiling water is ſometimes effuſed upon any ſubſtance, and allowed to ſtand upon it for ſome time. Water is alſo occaſionally effuſed cold in the ſame manner; and in this caſe the ſpecific form of cold infuſion is uſed.

The ſame operation is applicable to thoſe ſubſtances which contain any parts volatile in the heat of 212°, to the ſeparation of more readily ſoluble conſtituent parts from thoſe which are leſs ſo, and to the preparation of ſlighter impregnations than boiling for a length of time produces. The boiling temperature of the water is ſo ſoon loſt in this mode of application, that even with the moſt delicate ſubſtances it does no injury, and it aſſiſts in looſening the texture of the vegetable, and effecting the ſolution much ſooner than cold water alone does. Infuſions are uſually matters of extemporaneous preſcription, and cannot generally be kept ready prepared in the ſhops without ſpoiling. Their number has been extended to moſt of the articles in common uſe, and the ſtrength of each is accommodated to the moſt uſual ſtandards of practice. We ſhall recite ſome of the principal.

The *bitter infuſion* is prepared by cutting the tops of the leſſer centaury and chamomile flowers of each half an ounce, and the yellow rind of lemon and orange peel, of each two drams, in ſmall pieces, and infuſing them in a quart of boiling water. A tea-cupful of this infuſion may be taken twice or thrice a day for indigeſtion, weakneſs of the ſtomach, or want of appetite.

Infuſion of the Bark is made by infuſing an ounce of the powder in a pint of boiling water, with the addition of four or five table-ſpoonfuls of brandy, for two or three days. In diſorders which require the bark, a tea-cupful of this may be taken two or three times a day.

Infuſion of Calumba, infuſum Calumbæ, is prepared by ſlicing a dram of Calumba root, and macerating it for two hours in half a pint of boiling water in a covered veſſel, and ſtraining it. See Columbo.

Infuſion of Camomile, infuſum anthemidis, is made by macerating for ten minutes, in a covered veſſel, two drams of camomile flowers in a pint of boiling water, and ſtraining.

Infuſion of Carduus is made by infuſing an ounce of the dried leaves of carduus benedictus in a pint of common water for ſix hours, without heat, and then filtering the liquor through paper. This infuſion, which may be flavoured at pleaſure with cinnamon, or other aromatics, may be beneficially uſed in weakneſſes of the ſtomach, where the common bitters do not agree.

Infuſion of Caſcarilla is prepared by macerating for two hours, in a covered veſſel, half an ounce of Caſcarilla bark bruiſed in half a pint of boiling water, and ſtraining. See Cascarilla.

Infuſion of Catechu is obtained by taking 2½ drams of extract of catechu, and half a dram of bruiſed cinnamon bark, macerating them for an hour, in a covered veſſel, in half a pint of boiling water, and ſtraining. See Catechu.

Infuſion of Cinchona, infuſum cinchonæ, is obtained by macerating for two hours, in a covered veſſel, half an ounce of lance-leaved Cinchona bark in half a pint of boiling water, and ſtraining.

Infuſion of Cloves, infuſum caryophyllorum, is obtained by macerating for two hours, in a covered veſſel, a dram of cloves bruiſed in half a pint of boiling water, and ſtraining.

Infuſion of Cuſparia is procured by macerating for two hours, in a covered veſſel, two drams of bruiſed Cuſparia bark in half a pint of boiling water, and ſtraining.

Infuſion of Fox-glove, infuſum digitalis, is obtained by macerating for four hours, in a covered veſſel, a dram of purple fox-glove leaves, dried and powdered, in half a pint of boiling water, and ſtraining; then adding half a fluid-ounce of ſpirit of cinnamon. See Digitalis.

Infuſion, Compound, of Gentian, infuſum amaram ſimplex, P. L. 1745, is procured by macerating in a covered veſſel, gentian root ſliced and orange-peel dried, of each a dram, two drams of freſh lemon-peel, in twelve ounces of boiling water, and ſtraining.

Infuſion, Compound, of Horſe-radiſh, infuſum armoraciæ compoſitum, is procured by macerating for two hours, in a covered veſſel, freſh horſe-radiſh root ſliced, and muſtard ſeeds bruiſed, of each an ounce, in a pint of boiling water, and ſtraining; then adding a fluid-ounce of compound ſpirit of horſe-radiſh. An infuſion for the palſy may be made by infuſing horſe-radiſh root ſhaved, muſtard ſeed bruiſed, of each four ounces; and one ounce of the outer rind of orange-peel in two quarts of boiling water, in a cloſe veſſel for twenty-four hours. A tea-cupful of this warm ſtimulating medicine may be taken three or four times a day, in paralytic complaints. It excites the action of the ſolids, proves diuretic, and, with warmth, promotes perſpiration. If two or three ounces of the dried leaves of marſh-trefoil be uſed inſtead of the muſtard, we ſhall have the antiſcorbutic infuſion.

Infuſion of Linſeed, infuſum lini, is prepared by infuſing two ſpoonfuls of linſeed, or an ounce of linſeed bruiſed, and half an ounce of liquorice root ſliced, in two pints of boiling water by the fire for four hours, and then ſtraining off the liquor. The pectoral infuſion is made by adding to theſe ingredients an ounce of the leaves of colt's-foot. Theſe emollient liquors may be taken in difficulty of making water, and in coughs and other complaints of the breaſt.

Infuſion of Quaſſia is obtained by macerating for two hours, in a covered veſſel, a ſcruple of quaſſia-wood ſliced, in half a pint of boiling water, and ſtraining. See Quassia.

Infuſion of Rhubarb, infuſum rhei, is procured by macerating for two hours, in a covered veſſel, a dram of ſliced rhubarb-root in half a pint of boiling water, and ſtraining. See Rhubarb.

Infuſion of Roſes, infuſum roſæ, tinctura roſarum, P. L. 1718, tinctura roſarum rubrarum, P. L. 1720, is made by infuſing half an ounce of the petals of red roſes, dried, in 2½ pints of boiling water; afterwards pouring in three fluid-drams of dilute ſulphuric acid, and 1½ ounce of double refined ſugar. Pour the water upon the petals of the roſe in a covered glaſs veſſel: then add the acid, and macerate for half an hour. Laſtly, ſtrain the infuſion, and add the ſugar to it. A tea-cupful of this aſtringent infuſion may be taken every three or four hours, in an exceſſive flow of the menſes, vomiting of blood, and other hæmorrhages. It will likewiſe ſerve as a very good gargle.

Infuſion of Senna, infuſum Sennæ, is prepared by macerating for an hour, in a covered veſſel, 1½ ounce of Senna leaves, a dram of ſliced ginger-root, in a pint of boiling water, and ſtraining the liquor. An infuſion of Senna, named "infuſum Sennæ tartarizatum," may be had by adding extemporaneouſly to each pint of the infuſion two drams of ſupertartrate of potaſs, in ſuch proportions as circumſtances may require.

Infuſion of Senna and Tamarinds, is prepared by infuſing for four or five hours one ounce of tamarinds and ſenna, and cryſtals of tartar, of each two drams, in a pint of boiling water; ſtraining the liquor, and adding to it an ounce or two of the aromatic tincture. Perſons who are eaſily purged, may leave out either the tamarinds or the cryſtals of tartar. A tea-cupful of this agreeable cooling-purge may be taken every half hour till it operates.

Infuſion of Simarouba is made by macerating for two hours, in a covered veſſel, half a dram of Simarouba bark, bruiſed, in half a pint of boiling water, and ſtraining. See SIMAROUBA.

Infuſion, Spaniſh, is made by infuſing an ounce of Spaniſh juice cut into ſmall pieces, and three drams of ſalt of tartar in a quart of boiling water for a night; and adding to the ſtrained liquor an ounce and a half of the ſyrup of poppies. In recent colds, coughs, and obſtructions of the breaſt, a tea-cupful of this infuſion may be taken with advantage three or four times a day. See LIQUORICE.

Infuſion of Tobacco, infuſum tabaci, is made by macerating for an hour, in a covered veſſel, a dram of tobacco leaves in a pint of boiling water, and ſtraining. This infuſion is intended to be uſed as a clyſter, to which purpoſe it is often directed.

INFUSION is alſo uſed to ſignify the action of conveying liquor into the body by the veins. See INJECTION.

Some phyſicians have found out a new method of purging, by infuſing a cathartic into the veins, which operates pretty much after the manner of a clyſter.

ING, in *Agriculture*, a provincial term, employed to ſignify a common paſture or meadow which lies low or wet, and which is chiefly employed as hay lands.

INGA, in *Botany*. See MIMOSA.

INGANNO, *Ital.* a trick, a diſappointment, a diſappointed cadence, or cloſe, is, when, after preparing for a regular termination, ſome unexpected chord or modulation occurs to lengthen the movement and poſtpone the cadence. See CADENCE.

INGARD POINT, in *Geography*, a cape of Ireland, on the ſouth coaſt of the county of Wexford, within which lies the ſmall dry harbour of Feathard, which is only fit for ſmall veſſels.

INGARYD, a town of Sweden, in the province of Smaland; five miles S. of Jonkioping.

INGATESTONE, a ſmall town in the hundred of Chelmsford and county of Eſſex, England, is ſituated 23 miles from London, on the high road to Colcheſter. It conſiſts principally of one ſtreet, and contained, according to the late return to parliament, 120 houſes and 645 inhabitants. In the church, which has a high embattled brick tower, are ſeveral elaborate monuments of the Petre family, whoſe burial place adjoins the chancel on the north ſide. A conſiderable market was formerly held here, but having greatly declined, it has been for ſeveral years wholly diſcontinued; but a very large fair for Scotch and Welch cattle is ſtill held on the firſt of December, annually. An alms-houſe, for ſeven women and three men, was founded, in the year 1557, by ſir William Petre, and endowed by him to the amount of 90*l.* 13*s.* 4*d.* per annum.

Near the town is Ingateſtone-hall, a venerable, but irregular ſtructure, which was the family reſidence of the lords Petre, previous to the building of a new manſion at Weſt Thorndon. Beauties of England and Wales, vol. v.

INGATORP, a town of Sweden, in the province of Smaland; 40 miles N. of Wexio.

INGELFINGEN, a town of Germany, in the principality of Hohenloe, on the Kocher; eight miles N. E. of Ohrenburg.

INGELHEIM, OBER, a town of France, in the department of Mont Tonnerre, ſituated on the Selz; 12 miles W. of Mentz. N. lat. 49° 56′. E. long. 8° 1′.

INGELHEIM, *Nider*, a town of France, in the department of Mont Tonnerre, one mile from Ingelheim Ober.

INGELLY, a town of Hindooſtan, in Bengal, at the mouth of the Hoogly; 60 miles S. of Calcutta.

INGELMUNSTER, a town of France, with a caſtle, in the department of the Lys, and chief place of a canton, in the diſtrict of Courtray; five miles N. of Courtray. The town contains 4873, and the canton 14,284 inhabitants, on a territory of 52½ kiliometres in four communes.

INGELSBURG, a town of Saxony, in the Vogtland; nine miles S.S.E. of Oelſnitz.

INGELSTAD, a town of Sweden, in the province of Smaland; 10 miles S.E. of Wexio.

INGEMINATED FLOWERS, are thoſe where one flower ſtands on, or naturally grows out of another; called alſo proliferous flowers.

INGEN, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Lapland. N. lat. 70° 56′.

INGENDRING. See ENGENDERING.

INGENERATE, in *Natural Hiſtory*, is a term uſed to expreſs the kind of petrifactions produced by intromiſſion, or the introduction of the mineral particles into the internal texture of the original organized. Martin's "Outlines," p. 67.

INGENHOUZ, JOHN, in *Biography*, an eminent phyſician and chemiſt, was born at Breda in the year 1730. Little is known of his early life; but in 1767 he came to England with a view of obtaining information on the Suttonian method of inoculation for the ſmall-pox, and in the following year he went, on the recommendation of the late ſir John Pringle, to Vienna, to inoculate the archducheſs Thereſa-Elizabeth, only daughter of Joſeph II., and the archdukes Ferdinand and Maximilian, brothers of the emperor. For theſe ſervices he obtained rewards and honours: he was made body-phyſician and counſellor of ſtate to their imperial majeſties, with a penſion of 600*l.* per annum. In the following ſpring he went to Italy, and inoculated the grand duke of Tuſcany: after this he returned to England, to which he was much attached, where he ſpent his time in ſcientific purſuits. He publiſhed a very valuable work, entitled "Experiments on Vegetables, diſcovering their great power of purifying the common air in ſunſhine, but injuring it in the ſhade and night." This work was firſt publiſhed in 1779, and has been frequently referred to by Dr. Prieſtley and others, who have carried their obſervations much farther. It was tranſlated into the French and German languages, and highly eſteemed by all the experimental philoſophers of that period. He aſcertained, that not only from the green matter found on ſtagnant waters, but likewiſe from the leaves of vegetables, from the green branches and ſhoots, even from the entire vegetable, when placed under water and expoſed to the ſolar light, oxygen gas, in a ſtate generally of great purity, is evolved; and as the reſult of his numerous experiments he adopted the concluſion, that oxygen is elaborated in the leaves and other organs of vegetables, by a vital action excited and ſuſtained by the ſolar light. The doctor, through the whole of life, was fond of exhibiting among his friends, particularly young perſons, experiments of this kind, which required ſcarcely any apparatus, excepting a bell glaſs and a phial or two, and with the oxygen gas which he obtained from cabbage leaves or other vegetables, he would exhibit the combuſtion of iron wire, which is a ſtriking and very brilliant experiment. Dr. Ingenhouz was author of many papers inſerted in the Tranſactions of the Royal Society, of which body he was an active and uſeful member. Of theſe papers we may notice the following: Experiments on the torpedo:—Methods of meaſuring the diminution of bulk taking place on the mixture of nitrous with common air:—Experiments on the electrophorus:—New Methods of ſuſpending magnetic needles: —Conſiderations on the influence of the vegetable kingdom on the animal creation. He died in the year 1799, highly eſteemed for the ſimplicity of his manners, and for the diſcoveries which he had made in the ſeveral departments of experimental philoſophy. Monthly and Gentleman's Magazine. Murray's Chemiſtry.

INGENITE, Inborn, ſignifies any diſeaſe or habit which comes into the world with a perſon, nearly the ſame with hereditary.

INGENUITAS Regni, anciently ſignified the freeholders and commonalty of the kingdom: the title was alſo ſometimes given to the barons and lords of the king's council.

INGENUOUS, Ingenuus, among the Romans, a title applicable to a perſon born free, or of free parents.

Iſidore ſays, they are called *ingenui, qui libertatem habent in genere non in facto*; thoſe who are born free, not thoſe who acquire their freedom.

A perſon was accounted ingenuous, if only the mother were free, and the father a ſlave.

Theſe could give their votes, and enjoy offices, from which the *liberti*, or freedmen, &c. were debarred.

Ingenuous is ſometimes alſo uſed to ſignify a native of a country in contradiſtinction to a foreigner.

INGERAM, in *Geography*, a ſmall iſland in the ſtraits of Malacca, near the coaſt of Salengore. N. lat. 3° 15′. E. long. 101° 26′.—Alſo, a town of Hindooſtan, in the circar of Rajamundry; 30 miles S.E. of Rajamundry.

INGETORP, a town of Sweden, in the province of Schonen; 10 miles E. of Yſtad.

INGINEER, or Engineer. See Engineer.

INGKALU, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Lapland. N. lat. 70° 50′.

INGLEBOROUGH, a mountain of England, in the N.W. part of the county of York, ſaid to be 20 miles in circumference. The height is ſtated by Houſman to be 3987 feet; but by the barometrical meaſurement of Mr. Ewart 2377.12, and by trigonometrical meaſurement 2380.7 feet above the level of the ſea.

INGLOTT, William, in *Biography*, an organiſt of the cathedral church of Norwich, who ſeems, by an inſcription on his monument in that church honourable to his memory, to have been a man of no common abilities. We have never heard or ſeen any of his productions; but in all probability, Dr. Croft had; who, a hundred years after his deceaſe, had his monument repaired. Inglott died in 1621.

INGLUVIES. See Craw.

INGOLSTADT, in *Geography*, a town of Bavaria, ſituated on the Danube, and ſurrounded with a moraſs. It has an univerſity, founded in the year 1472, which embraced the Reformation in 1743; 37 miles N. of Munich. N. lat. 48° 43′. E. long. 11° 22′.

INGOT, a maſs or lump of gold or ſilver, from the mines, melted down, and caſt in a ſort of mould, but not coined or wrought.

The word ſeems formed from the French *lingot*, which ſignifies the ſame.

Ingot is alſo a name given to the moulds or cavities, wherein they caſt melted metals, or regulus of ſemimetals.

INGOULT, Nicholas Louis, in *Biography*, a French Jeſuit, was born at Giſors, devoted himſelf to an eccleſiaſtical life, and became a very eloquent preacher. He publiſhed the eighth volume of the Memoirs of the Miſſions of the Society of Jeſus in the Levant. He was author alſo of ſermons which were highly applauded. He died in 1753.

INGOUVELLE, in *Geography*, a town of France, in the department of the Lower Seine, and chief place of a canton, in the diſtrict of Le Havre. The place contains 5500, and the canton 10,347 inhabitants, on a territory of 40 kiliometres, in ſix communes.

INGRAFTING, or Engrafting. See Engrafting.

INGRAILED. See Engrailed.

INGRAM, Robert, in *Biography*, was born in Yorkſhire, and educated at Beverley ſchool, from whence he was ſent to Corpus Chriſti college, Cambridge, of which he became fellow, and took there his degrees in arts. His firſt preferment was the perpetual curacy of Bridhurſt, in Kent, after which he obtained ſucceſſively the ſmall vicarage of Orſton, in Nottinghamſhire, and the vicarages of Wormington and Boxted, in Eſſex. He died in 1804, leaving behind him a high character for ſimplicity of manners, great integrity, and genuine benevolence. He had a high ſenſe of the dignity and importance of the clerical functions, and for 50 years of his life was indefatigable in his attention to profeſſional duties. He was author of "A view of the great events of the ſeventh plague, or period, when the myſtery of God ſhall be finiſhed." "Accounts of the ten tribes of Iſrael being in America, originally publiſhed by Manaſſeh Ben Iſrael, &c." "A complete and uniform explanation of the prophecy of the ſeven vials of wrath, or ſeven laſt plagues contained in the Revelations of St. John, &c."

INGRASSIAS, John Philip, was a native of Sicily. He ſtudied medicine at Padua, where he took the degree of doctor in medicine in the year 1537, with ſingular reputation; inſomuch that he ſoon received ſeveral invitations to profeſſorſhips from different ſchools in Italy. He accepted the chair of medicine and anatomy at Naples, which he occupied for a number of years, lecturing to the moſt crowded audiences drawn by his fame from all parts of the country. He poſſeſſed peculiar qualifications for the office, having united a conſummate knowledge of the writings of the ancient phyſicians with great practical ſkill and a ſound judgment, which led him to eſtimate juſtly the merits and defects of thoſe fathers of the art. A ſingular teſtimony of his talents and unremitting attention to the improvement of his pupils was given by the latter, who cauſed his portrait to be placed in the ſchools of Naples with the following inſcription: "Philippo Ingraſſiæ Siculo, qui veram medicinæ artem et anatomen, publicè enarrando, Neapoli reſtituit, Diſcipuli memoriæ cauſa, P. P." At length he quitted his ſituation at Naples in order to return to his native iſland, where he ſettled at Palermo. Here alſo he received many marks of public diſtinction. The rights of citizenſhip were conferred upon him; and in 1563, Philip II. king of Spain, appointed him firſt phyſician for Sicily and the adjacent iſles. By virtue of the powers attached to this office he reſtored order in the medical conſtitution of the country, by preventing all perſons, unqualified by their education and abilities, from practiſing there. His zeal for the credit of his profeſſion rendered him rigid and ſevere in his examination of candidates; and he exerciſed his art himſelf in the moſt honourable manner. When the plague raged at Palermo in 1575, he adopted ſuch excellent regulations, in quality of deputy of health and firſt conſultant, that he put a ſtop to the calamity, and reſtored the city to health, and was hailed by all the citizens, the Sicilian Hippocrates. The magiſtrates were ſo grateful for his ſervices, that they voted him a reward of two hundred and fifty gold crowns a month: but he diſintereſtedly declined to accept any more than what ſerved for the maintenance and decoration of the chapel of St. Barbe, which he had built in the cloiſter of the Dominican convent of Palermo. He died greatly regretted in 1580, at the age of 70 years.

Ingraſſias cultivated anatomy with great aſſiduity, and is eſteemed one of the improvers of that art, eſpecially in regard to the ſtructure of the cranium, and the organ of hearing. He diſcovered the ſmall bone of the ear, called the *ſtapes*, which has been claimed as the diſcovery of others, but is admitted even by Fallopius to have been his. He deſcribed minutely the cavity of the *tympanum*, the *feneſtra rotunda* and *ovalis*, the *cochlea*, ſemicircular canals, maſtoid cells, &c.; and Eloy thinks, from a view of his plates, that he was acquainted with the muſcle of the *malleus*, the diſcovery of which is aſcribed to Euſtachius. He is ſaid alſo to have diſcovered the ſeminal veſicles. He was author of the following works: 1. "Jatropologia; Liber quo multa adverſus Barbaros Medicos diſputantur," Venice, 1544, 1558, 8vo.—2. "Scholia in Jatropologiam," Naples, 1549, 8vo.—3. "De Tumoribus præter naturam," *ibid.* 1553, folio, vol. i. This is properly a commentary on ſome of the books of Avicenna.—4. "Raggionamento fatto ſopra l'infermita epidemica dell' anno 1558," Palermo, 1560, 4to., together with "Trattato di due moſtri nati in Palermo in diverſi tempi."—5. "Conſtitutiones et Capitula, necnon Juriſdictiones Regii Proto-Medicatûs officii, cum Pandectis ejuſdem reformatis," Palermo, 1564, 1657, 4to.—6. "Quæſtio de purgatione per medicamentum, atque obiter etiam de ſanguinis miſſione, an ſextâ die poſſit fieri," Venice, 1568, 4to.—7. "Galeni Ars Medica," *ibid.* 1573, folio.—8. "De frigidæ potu poſt medicamentum purgans Epiſtola," *ibid.* 1575, 4to., reprinted at Milan, 1586.—9. "Informatione del peſtifero e contagioſo morbo, il quale afflige e habe afflito la citta di Palermo, e molte altre citta e terre del regno di Sicilia, nell' anno 1575 e 1576," Palermo, 1576, 4to. This work was tranſlated into Latin by Joachim Camerarius, and publiſhed under the title of "Methodus curandi peſtiferum contagium," at Nurimberg, 1583.—10. "In Galeni Librum de oſſibus doctiſſima et expertiſſima Commentaria," a poſthumous publication, printed at Meſſina, in 1603, under the inſpection of his nephew, Nicholas Iugraſſias. This, which may be deemed the principal work of Ingraſſias, contains the text of Galen, in Greek and Latin, with a very diffuſe and learned commentary, in which there is much minute and accurate deſcription, particularly of the parts belonging to the organ of hearing. The figures are thoſe of Veſalius. The author defends Galen as far as he is able, but not againſt the truth of modern diſcovery. See Eloy. Dict. Hiſt. Gen. Biog. Haller Bibl. Anatom.

INGRAVING, or Engraving. See Engraving.

INGRE, in *Geography*, a town of France, in the department of the Loiret, and chief place of a canton, in the diſtrict of Orleans; four miles N. W. of Orleans. The place contains 2905, and the canton 10,810 inhabitants, in a territory of 16 kiliometres, in 10 communes.

INGREDIENTS, all the ſimples which go into the compoſition of any medicine, ointment, ſauce, or the like.

INGRESS, in *Aſtronomy*, the ſun's entering the firſt ſcruple of one of the four cardinal ſigns, eſpecially Aries.

Ingreſs, *Egreſs*, and *Regreſs*, in *Law*, are words in leaſes of land, ſignifying a free entry into, a going out of and returning from ſome part of the premiſes leaſed to another; as to get in a crop of corn, &c. after the term expired.

INGRESSU, a writ of entry, whereby a perſon ſeeks entry into lands or tenements. It lies in various caſes, and has various forms. It is alſo called *precipe quod reddat*.

INGRIA, or Ingermanland, in *Geography*, that part of Ruſſia, which was wreſted by Peter the Great from the Swedes, and confirmed to Ruſſia at the peace of Nyſtadt in 1721. It is now called the "Government of St. Peterſburg;" which ſee.

INGRIN, or Grain, a town of Africa, in the country of the Foulahs; 30 miles S.W. of Cayor.

INGROSSATOR *Magni Rotuli*, is the ſame as clerk of the pipe.

INGROSSER, or Engroſſer, in *Common Law*, is one who buys up corn growing, or any proviſions by wholeſale, before the market, to ſell again. See Foreſtalling.

It alſo ſignifies a clerk, who writes records, or inſtruments of law, on ſkins of parchment. See Engroſſing.

INGROSSING *of a Fine*, is the making the indentures by the chirographer, for delivery of them to the party to whom the fine is levied.

INGROWITZ, in *Geography*, a town of Moravia, in the circle of Brunn; 30 miles N.N.W. of Brunn. N. lat. 49° 36'. E. long. 16° 2'.

INGSKAR, a ſmall iſland in the gulf of Bothnia. N. lat. 61° 15'. E. long. 17° 24'.

INGUE-LOUKA, a town of Chineſe Tartary. N. lat. 42° 16'. E. long. 124° 44'.

INGUEN, in *Anatomy*, the technical term for the groin.

INGUIMBERTI, Dominic-Joseph-Mary d', in *Biography*, a learned French prelate, was born at Charpentras in 1683. He devoted himſelf from a very early age to the eccleſiaſtical profeſſion, became a member of the Dominicans, and afterwards joined the Ciſtercians, in order that he might ſubmit to what he conceived the more perfect rules of monaſtic diſcipline. In this laſt order his merits raiſed him to the higheſt offices of honour and confidence. Being deputed to Rome on the buſineſs of his monaſtery, he ſo highly recommended himſelf to the eſteem of pope Clement XII. that in the year 1733, he was raiſed to the rank of biſhop of Charpentras, and other eccleſiaſtical preferment. He died in the year 1757, and is known in the republic of letters by ſeveral original works, and tranſlations of others. As a biſhop he obtained univerſal reſpect, and employed his wealth in ſerving the public and in relieving the poor. He built a large and noble hoſpital, and he collected the moſt extenſive and valuable library in Provence, which he gave for the uſe of the public.

INGUINAL Glands, in *Surgery*. See Glands.

Inguinal *Hernia*, a rupture, or protruſion of the bowels at the abdominal ring; a bubonocele. See Hernia.

Inguinal *Ligament*. This, which has been alſo called from its diſcoverer ligamentum Fallopii, is an aponeurotic, or ligamentary band, faſtened by one end to the anterior and ſuperior part of the os ilium, and by the other to the ſpine of the os pubis. The middle portion of it is very narrow, but it expands conſiderably towards both its extremities. It is cloſely joined to the muſcles of the abdomen, and to the aponeurotic faſcia of the thigh, but ſeems to be often wanting.

INGUINALIS, in *Anatomy*, an epithet ſometimes applied to the external iliac artery and vein.

INGUL, in *Geography*, a river of Ruſſia, which runs into the Bug, near Matvievka.

INGULETZ, a river of Ruſſia, which runs into the Dnieper; 12 miles N.E. of Cherſon.

INGULPHUS, in *Biography*, a monaſtic hiſtorian, was the ſon of a courtier of Edward the Confeſſor, and was born at London about 1030. He purſued his maturer ſtudies at Weſtminſter and Oxford, and diſtinguiſhed himſelf as a great adept in the Peripatetic philoſophy. Scarcely had he attained the age of manhood when he was appointed ſecretary to duke William, by whoſe permiſſion he viſited the Holy Land and Conſtantinople in 1064, and upon his return, he entered into the order of the Benedictines at the abbey of Fontenelle, in Normandy, of which he became prior. When his patron, William, obtained the crown of England, Ingulphus was created abbot of the rich monaſtery of Croyland, which being in a dilapidated ſtate, he rebuilt, and for which he obtained many privileges. He died in 1109, leaving behind him as evidences of his great learning, a work on the life and miracles of St. Guthlac, and a hiſtory of the monaſtery of Croyland. The laſt gives the author rank with the Engliſh hiſtorians. It was publiſhed at London, by ſir Henry Saville, among the quinque ſcriptores, in 1596, being almoſt five hundred years after the death of the author. It has been ſeveral times reprinted: the beſt edition is that of Oxford, in 1684.

INGULSK, in *Geography*, a town of Ruſſia, in the government of Ekaterinoſlav, on the Ingul; 28 miles S. of Elizavet.

INGURTY, a town of Hindooſtan, in the province of Golconda; 22 miles S.E. of Warangole.

INGWEILER, a town of France, in the department of the Lower Rhine, on the Motter; 21 miles N.N.W. of Straſburg.

INHALER, in *Surgery*, a machine lately invented by Mr. Mudge, and ſo contrived, that the air drawn through a tube in reſpiration, paſſes firſt through hot water, and thus comes to the lungs loaded with warm vapour. The ſame air, when expelled in expiration, paſſes back through the tube, and thence through a valve, when by proper management it may be diſtributed over the ſurface of the body and thus act as a vapour-bath. The author's directions for the proceſs are as follow:

In the evening, a little before bed-time, the patient, if of adult age, is to take three drams, or as many tea-ſpoonfuls of elixir paregoricum in a glaſs of water: if the ſubject is younger, *e.g.* under five years old, one tea-ſpoonful; or within that and ten years, two. About three quarters of an hour after he ſhould go to bed, and being covered warm, the inhaler, filled three parts with water nearly boiling, and wrapped up in a napkin, but ſo that the valve in the cover is not obſtructed by it, is to be placed at the arm-pit, and the bed-cloaths being drawn up, and over it cloſe to the throat, the tube is to be applied to the mouth, and the patient ſhould inſpire and expire through it about twenty minutes or half an hour. This, he aſſures us, is an infallible and immediate cure for the cough conſequent on catching cold. Mudge's radical and expeditious Cure for a recent Catarrhous Cough, 1778.

INHALLOW, in *Geography*, one of the ſmaller Orkney iſlands, between Pomona and Rouſa.

INHAMBANE, or INNANBAM, a kingdom of Africa, in the country of Mocaranga, bounded N. by Sabia, E. and S.E. by the Indian ſea, S.W. by the river Manica, and N.W. by an unknown country.

INHAME, in *Botany*. See DIOSCOREA.

INHAMOIT, in *Geography*, a town and diſtrict of Africa, in the country of Mocaranga, ſituated about S. lat. 17° 30′. E. long. 31° 20′.

INHAMPURA, a river of Africa, in the kingdom of Inhambane, which runs into the Indian ſea, S. lat. 24° 30′.

INHANBANO, a river of Africa, which runs into the Indian ſea, S. lat. 23° 15′.

INHANGOMA, an iſland of Africa, in the river Zambeze. S. lat. 17° 45′. E. long. 32° 20′.

INHANZARA, a town of Nubia, in Sennaar; 30 miles from Gieſſen.

INHAQUEA, a town of Africa, in the kingdom of Sofala, poſſeſſed by the Portugueſe, near the ſea-coaſt; 20 miles S.W. of Sofala.

INHARMONICAL RELATION, in *Muſic*. See RELATION, *inharmonical*.

INHARMONICAL, is ſaid of an interval or chord that is impracticable in harmony, and, conſequently, in melody. Notes out of tune are inharmonical.

INHARMONIOUS, or unnatural relations, according to Mr. John Holden (Eſſay, p. 331.) are ſuch intervals as reſult from the ſums of notes or intervals not contiguous in the ſcale, as a minor third to a major ſeventh, &c.

INHASATO, in *Geography*, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 20° 35′.

INHERENCE, in *Philoſophy*, is applied to the juncture or connection of an accident with its ſubſtance.

Thus quantity has a neceſſary inherence in a natural body.

INHERENT, in *Natural Hiſtory*, is a term uſed by Mr. William Martin (Outlines, p. 180.) to expreſs that claſs of organic remains or reliquia, which ſtick in the ſurface of the matrix or ſeat. The extraneous foſſils of veins are frequently found in this ſtate.

INHERITABLE BLOOD, in *Law*. See BLOOD.

INHERITANCE, HÆREDITAS, a property in lands and tenements to a man and his heirs. See ESTATE, in *Law*.

Inheritance is not only underſtood where a man hath inheritance of lands and tenements by deſcent or heritage; but every fee-ſimple or fee-tail, that a man hath by his purchaſe, may be ſaid to be an inheritance, becauſe his heirs may inherit it after him. (See FEE-*ſimple* and FEE-*tail*.) The inheritances mentioned in our law are either corporeal or incorporeal; the corporeal relate to houſes, lands, &c. that may be touched or handled; and the incorporeal are rights iſſuing out of, annexed to, or exerciſed with corporeal inheritances; as advowſons, tithes, annuities, offices, commons, franchiſes, &c. (See HEREDITAMENTS.) There is likewiſe another inheritance denominated ſeveral, that is, where two or more hold lands ſeverally; as when two perſons hold to them and the heirs of their two bodies, in which caſe theſe two have joint-eſtate during their lives, but their heirs have ſeveral inheritances. Goods and chattels cannot be turned into an inheritance. For the rules of inheritance, ſee DESCENT, *collateral*.

INHIBITION, a writ to inhibit or forbid a judge from farther proceeding in a cauſe depending before him.

Sometimes prohibition and inhibition are put together, as of the ſame import; but inhibition is moſt commonly a writ iſſuing out of a higher court-chriſtian to a lower; and prohibition out of the king's court to an inferior court.

INHIBITION, in *Scots Law*, is a perſonal prohibition, which paſſes by letters under the ſignet, prohibiting the party inhibited to contract any debt, or do any deed, by which any part of his lands may be aliened or carried off in prejudice of the creditor inhibiting. It muſt be executed againſt the debtor, perſonally, or at his dwelling-houſe, as ſummonſes, and afterwards publiſhed and regiſtered in the ſame manner with interdictions. Inhibition may proceed either upon a liquid obligation, or even as an action commenced by a creditor for making good a claim not yet ſuſtained by the judge; which laſt is called "inhibition upon a depending action." Although inhibitions, by their uniform ſtyle, diſable the debtor from ſelling his moveable as well as his heritable eſtate, their effect has been long limited to heritage, from the interruption that ſuch an embargo upon moveables muſt have given to commerce; ſo that debts, contracted after inhibition, may be the foundation of diligence againſt the debtor's perſon and moveable eſtate. An inhibition ſecures the inhibitor againſt the alienation, not only of lands that belonged to his debtor, when he was inhibited, but of thoſe which he ſhall afterwards acquire; but no inhibition can extend to ſuch after-purchaſes as lie in a juriſdiction where the inhibition was not regiſtered; for it could not have extended to thoſe though they had been made prior to the inhibition. An inhibition is ſimply prohibitory; ſo that the debt on which it proceeds, continues perſonal after the diligence. The heir of the perſon inhibited is not reſtrained from alienation by the diligence uſed againſt his anceſtor, for the prohibition is perſonal, affecting only the debtor againſt whom the diligence is uſed. Inhibitions do not of themſelves make void the poſterior debts or deeds of the perſon prohibited. When payment is made by the debtor to the inhibitor, the inhibition is ſaid to be "purged."

INHOC, or Inhoke, in our *Old Writers*, is uſed for any corner or part of a common field ploughed up and ſowed with oats, &c. and ſometimes fenced in with a dry hedge in that year wherein the reſt of the ſame field lies fallow and common. It is called in the North of England an *intock*, and in Oxfordſhire a *hitchin*. And no ſuch *inhoke* is now made without the joint conſent of all the commoners, who in moſt places have their ſhare by lot in the benefit of it, except in ſome manors where the lord has a ſpecial privilege in ſo doing. Kennet's Paroch. Antiq. 297, &c. and his Gloſſary.

The word is Saxon, compounded of *in*, *within*, and *hoke*, *a corner*.

INHUMATION. See Burial and Interment.

Inhumation, in *Chemiſtry*, a method of digeſting ſubſtances together, by burying the veſſel in which they are put in horſe-dung, or in dry ſandy earth expoſed to the ſun. See Digestion.

INIA, in *Geography*, a river of Ruſſia, which runs into the Oby, 50 miles N.E. of Kolivan.—Alſo, a river of Ruſſia, which runs into the Lena, N. lat. 55° 20′. E. long. 116° 14′.

INJAMBI, or Tiete, a river of Brazil, which runs into the Parana, 180 miles N.W. of St. Paul, on the borders of Paraguay.

INIARA, a town of Ruſſia, in the government of Penza; 48 miles W. of Penza.

INJECTION, in *Anatomy*, is the art of filling the blood-veſſels or other hollow organs of the dead body with various ſubſtances, for the purpoſe of inveſtigating their ſtructure, ſituation, &c. or for diſplaying any facts connected with theſe ſubjects by ſubſequent artificial preparation. See Preparations, *Anatomical*.

Injection, in *Pharmacy*, any liquid medicine made to be injected or thrown into the body, or any of its parts, by a ſyringe, clyſter-pipe, or other inſtrument.

Injection, or *Injecting*, in *Surgery*, the throwing in ſome liquor or medicine into a vein opened by inciſion. This practice, and that of transfuſion, or the conveying the arterial blood of one man, or other animal, into another, were once greatly practiſed, but are now laid aſide.

The method of injecting is this: a vein is to be opened in the arm with a lancet as in bleeding, and a ſmall pipe of a ſyringe being introduced at the orifice, the liquor intended to be mixed with the blood, and contained for that purpoſe in the body of the ſyringe is to be forcibly injected, or thrown into the vein upwards, or toward the heart; which done, the orifice is to be ſecured with compreſſes and bandages as in bleeding.

Whether this practice of injecting proper medicines into the blood may not be found of uſe in apoplexies, quinſies, hydrophobia, &c. is worthy to be tried by repeated experiments. The method of injecting liquors into the blood of living animals, is ſaid to be the invention of ſir Chriſtopher Wren. His method was by making ligatures on the veins, and opening them on the ſide of the ligature towards the heart: then putting into them ſmall ſyringes or quills faſtened to bladders in the manner of clyſter-pipes, containing the matter to be injected. Mr. Boyle ſoon made the experiment upon dogs, with infuſions of opium and crocus metallorum; all which he circumſtantially deſcribed, in his Uſefulneſs of Experimental Philoſophy, part ii. eſſ. 2. Phil. Tranſ. N° 7. p. 128.

The ingenious Dr. Hales made a variety of experiments of this kind on different animals. See his Statical Eſſays, vol. ii. paſſim.

Many diſorders of particular parts are no way curable, unleſs the parts affected are injected with a proper liquor by means of a ſyringe and proper tube. The method of performing this is too obvious to need any directions; but theſe general cautions are neceſſary in regard to it, that the ſyringe or tube be applied tenderly and carefully to the parts, eſpecially in very ſenſible or nervous parts, to avoid giving the patient any pain; and that the liquor to be injected be neither too hot nor too cold.

In ulcerations and inflammations of the uvula, tonſils, and fauces, injections are generally uſeful: but care muſt be taken to preſs down the tongue with a ſpatula, or with the flat end of a ſpoon, and having introduced the ſyringe two or three fingers breadth into the mouth, the injection is to be carefully and gently thrown in at ſeveral times. In gonorrhœas, injections are often neceſſary to allay the heat and ſoreneſs of the urethra, and to waſh out the matter. The ſafeſt and beſt injections on this occaſion are warm milk and barley-water, ſweetened with ſugar, honey, or ſyrup of marſhmallows; and towards the end a little ſaccharum ſaturni, diſſolved in plantane water.

INJELLEE, in *Geography*, a province of Bengal, on the right ſide of the Hoogly, near its mouth.

INIO, a ſmall iſland in the Baltic, near the coaſt of Finland, with a town. N. lat. 60° 26′. E. long. 21° 14′.

INIS, a word in the Iriſh language ſignifying *iſland*; and therefore uſed as a prefix to the names of many iſlands on the coaſt of Ireland, ſome of which are noticed in ſucceeding articles, but a much greater number paſſed by as too inſignificant.

INISBEG, in *Geography*, the name of ſeveral ſmall iſlands on the coaſt of Ireland, the name ſignifying *Little Iſland*. One of theſe is in a ſmall bay of the county of Cork, near the town of Skibbereen; another is on the weſt coaſt of Kerry, near the Great Blaſket iſland; and a third is on the north coaſt of the county of Donegal, about 6 miles N.E. of Bloody Farland Point.

INIS-BOFFIN, or Ennisboffin *i. e.* the iſland of the *White Cow*, an iſland near the weſt coaſt of Ireland, containing 1200 acres. It is about a mile and a half from the main land of the county of Galway, and is a pariſh in the dioceſe of Tuam. There was formerly an abbey here. There is an iſland of the ſame name on the coaſt of Donegal, about four or five miles E. by N. of Bloody Farland Point; and a third in Lough Ree, an expanſion of the river Shannon, in which was an abbey that the Danes plundered and deſtroyed in 1089. Beaufort, Carliſle.

INISCALTRA, or Iniscalthra, an iſland ſituated in the river Shannon, belonging to the county of Galway, about two miles S. from mount Shannon, and eight N. by W. from Killaloe. In this beautiful iſland are a fine anchoret tower, above ſeventy feet high, and the remains of ſeven ſmall churches.

INISCATTERY, or Iniscathrie, an iſland belonging to the county of Clare, province of Munſter, Ireland. This rich and beautiful little iſland is ſituated at the entrance of the river Shannon, between the counties of Kerry and Clare, two miles S. by W. from Kilruſh, and nearly oppoſite to the caſtle of Canrigfoile, which was beſieged and taken by ſir W. St. Leger in 1580. According to Mr. Archdall, a monaſtery was founded in Iniſcattery, of which St. Senan was the firſt abbot. There were eleven churches for the monks, and no women were permitted to land on the iſland before the coming of the Danes into Ireland. In proceſs of time it became a priory of regular canons. The monument of St. Senan is ſtill to be ſeen here, with the remains of eleven ſmall churches and ſeveral cells: in the ſtone that encloſes the top of the altar window of the great church is the head of the ſaint with his mitre, boldly executed, and but little defaced. An ancient round tower of 120 feet in height, and in complete repair, graces the ſcene. This iſland is remarkable for the reſort of pilgrims on certain feſtivals. Archdall, Carliſle.

INISDRISUL, or Inisdriscol, an iſland belonging to the county of Cork, province of Munſter, Ireland, ſituated in *Roaring Water Bay*, a little north of Cape Clear iſland.

INISDUFF, or Innisduh, a ſmall iſland off the coaſt of Donegal, in the province of Ulſter, Ireland, about ſix miles N.E. from Bloody Farland Point. Carliſle.

INISFREE, the name of two iſlands off the weſt coaſt of the county of Donegal, province of Ulſter, Ireland; one of which is in the cluſter of the North Arran iſles, a little ſouth of Rutland; the other, which gives name to a ſmall harbour, lies between Rutland and Bloody Farland Point. M'Kenzie, Beaufort.

INISGLORA, a ſmall uninhabited iſland off the weſt coaſt of Mayo, in the province of Connaught, Ireland.

INISGOULA, an iſland in Clew bay, county of Mayo, province of Connaught, Ireland, on the eaſt ſide of which is good anchorage for large veſſels. Mackenzie.

INISHARK Island, an iſland near the weſt coaſt of Ireland and county of Galway. N. lat. 53° 34′. W. long. 10° 14′.

INISHEGIL, or, according to Mackenzie, *Iniſhegil*, an iſland off the coaſt of Mayo, Ireland, between Achill iſland and the main land.

INISHERKAN, an iſland near the ſouth coaſt of Ireland, belonging to the county of Cork, on the weſt ſide of Baltimore harbour. N. lat. 51° 24′. W. long. 9° 19′.

INISHONAN, or Inishannon, a poſt-town of Ireland, in the county of Cork, and province of Munſter. It is on the Bandon river, ten miles from Cork, three from Bandon, and 133 S.W. from Dublin.

INISHOWEN, a large peninſula and barony of the county of Donegal, Ireland, which ſtretches N.E. from Londonderry, bounding Lough Foyle. It is a dreary mountainous region, but great exertions have been made to meliorate its natural rudeneſs. It indeed returns a greater rent than any other part of the county. The mountains feed a number of cattle, and the flats produce tolerable crops. They have manure of the beſt quality in abundance, ſuch as limeſtone, ſhells, and ſea-ware, which act powerfully upon the barrenneſs of the ſoil. Robertſon.

Inishowen *Head*, a cape in Ireland, forming the eaſtern extremity of the peninſula, a little north of the entrance into Lough Foyle. N. lat. 55° 15′. E. long. 6° 48′.

INISKEA, the name of two ſmall iſlands off the weſt coaſt of Ireland, between which there is good anchorage. They are about two miles from the peninſula of the Mullet, in the county of Mayo; between 54° 7′, and 54° 10′ N. lat. and 10° W. long.

INISLIRE, an iſland in Newport or Clew bay, county of Mayo, Ireland, which gives name to one of the beſt ſtations for veſſels in that extenſive bay. Mackenzie.

INISMURRY, Inismurra, or *Innis-muidhr*, an iſland which lies off the coaſt of Sligo, Ireland, about three miles diſtant from the main land. It contains 130 acres, two wells of excellent water, and ſome bog of remarkably good turf. The inhabitants are few, and live by fiſhing. There are the remains of ſome chapels within a ſtone wall ten feet high, and from five to ſeven and eight feet thick, without cement. Mr. Archdall ſays it is impoſſible to determine whether it is round or oval; and that more rude, inelegant workmanſhip was never ſeen. There are a few cells under ground, which receive their light, ſome through a hole at the top, others through a loop-hole in the ſide; they are dark and horrible dungeons. Gen. Vallancey infers from part of theſe ruins, that in Pagan times, the iſland was dedicated to the worſhip of Boodha, and ſays that a monument in this iſland is an exact repreſentation of the Mahoody of the Gentoos found in the iſland of Elephanta, near Bombay, by captain Pyke. Many devotees ſtill flock to this iſland to do penance in the cells, and many are brought from great diſtances to be buried in the churches. There is a ledge of rocks running from this iſland, which require the attention of all who enter the bay of Sligo. Vallancey's Proſpectus of a Dictionary; Carliſle.

INISTIOGE, a ſmall poſt-town of Ireland, in the county of Kilkenny, and province of Leinſter. It is ſituated on the river Nore, which is navigable to it, and over which it has a bridge with ten arches. Iniſtioge is one of theſe places which before the Union ſent two members to the houſe of commons of Ireland. It is 63 miles S.W. from Dublin.

INISTUISKAR, an iſland off the weſt coaſt of the county of Kerry, Ireland, about four miles from Caunſza head, and north of the Blaſquets. N. lat. 52° 8′. W. long. 10° 25′.

INISTURC, an iſland ſituated about ſeven miles from the weſt coaſt of Mayo, Ireland, not far from the Killeries. N. lat. 53° 42′. W. long. 10°.

INITIALIA, a name anciently given to the myſteries of Ceres. See Cerealia.

INITIALIS *et pauſa generalis*, the beginning of a muſical compoſition, and the end. See Tempo, Prolation, and Pause.

INITIANS Punctum. See Punctum.

INITIATE, *Tenant by Curteſy*, in *Law*. See Tenant.

INITIATED, a term properly uſed in ſpeaking of the religion of the ancient heathens; where it ſignifies being admitted to the participation of the ſacred myſteries.

The word comes from the Latin *initiatus*, of *initiare*, *initiari*; which properly ſignifies to begin ſacrificing, or to receive or admit a perſon to the beginning of the myſteries; or of ceremonies of leſs importance.

The ancients never diſcovered the deeper myſteries of their religion, nor even permitted ſome of their temples to be opened to any but thoſe who had been initiated. See Mystery.

INJUNCTION, in *Law*, a writ generally grounded upon an interlocutory order or decree out of the court of chancery or exchequer, ſometimes to give poſſeſſion to the plaintiff, for want of the defendant's appearance; ſometimes to the king's ordinary court, and ſometimes to the court-chriſtian, to ſtop proceedings in a cauſe, upon ſuggeſtion made, that the rigour of the law, if it take place, is againſt equity and conſcience in that caſe, that the complainant is not able to make his defence in theſe courts for want of witneſſes, &c. or that they act erroneouſly denying him ſome juſt advantage. The writ of injunction is directed not only to the party himſelf, but to all and ſingular his counſellors, attornies, and ſolicitors; and if any attorney, after having been ſerved with an injunction, proceeds afterward contrary to it, the court of chancery will commit the attorney to the fleet for contempt. But if an injunction be granted by the court of chancery in a criminal matter, the court of king's bench may break it, and protect any that proceed in contempt of it.

INJURY, Injuria, in a general ſenſe, ſignifies any thing contrary to juſtice and equity; that is, any wrong or damage done to a man's perſon, reputation, or goods.

The word is derived from the Latin prepoſition *in*, which here has a negative power; and *jus, law, right: injuria, dicitur omne quod non jure fit.* The ancients made a goddeſs of injury, and called her Ate. Homer makes her the daughter of Jupiter, and ſays ſhe did miſchief to every body, even to her father; that ſhe was very nimble and tender-footed, and walked altogether on men's heads without ever touching the ground.

Civilians define injury a private offence, committed deſignedly, and with an evil intention to any man's prejudice, with regard to his perſon or his property. All civil injuries are of two kinds; the one without force or violence, as ſlander or breach of contract; the other joined with force and violence, as batteries and falſe impriſonment. The author of the Rhetorics to Herennius ſays, "Injuria eſt quæ aut pulſatione, aut convitio, aut turpitudine, corpus, aures, aut vitam alicujus violavit."

By the Roman law, the action for an injury was annual: that is, no reparation could be required after the expiration of a year. By the law of the twelve tables, where the injury was the breaking of a limb, the injured perſon might demand talionem, that is, that he might break the ſame limb of the criminal.

For the breaking of a bone there were alſo conſiderable pecuniary puniſhments aſſigned: for other injuries only twenty aſſes were decreed, which the poverty of thoſe times thought a ſufficient penalty; but the prætors afterwards finding this too ſlender a ſatisfaction, in lieu thereof, appointed the injured perſon to ſet a rate on the injury, which they afterwards increaſed or leſſened as they thought good.

Some of our lawyers make a diſtinction between a *damage* and an injury; and indeed there are many acts which may be done to the prejudice of a third perſon, which may be properly ſaid to be *damnum ſine injuria.*

As the abſolute rights of individuals are thoſe of perſonal ſecurity, perſonal liberty, and private property, the wrongs or injuries affecting them muſt conſequently be of a correſponding nature. Injuries that affect the perſonal ſecurity of individuals are injuries againſt their lives, their limbs, their bodies, their health, or their reputation. For the firſt claſs of injuries, ſee Homicide, Manslaughter, and Murder. The two next ſpecies of injuries, affecting the limbs or bodies of individuals, may be committed by *threats, aſſault, battery, wounding, mayhem,* which ſee reſpectively. For the four laſt injuries now enumerated, an indictment may be brought as well as an action; and frequently both are accordingly proſecuted, the one at the ſuit of the crown for the crime againſt the public; the other at the ſuit of the party injured, to make him a reparation in damages. Injuries affecting a man's health are thoſe by which any unwholeſome practices of another cauſe a man to ſuſtain any apparent danger in his vigour or conſtitution: as by ſelling him bad proviſions, as wine (1 Roll. Abr. 90.); by the exerciſe of a noiſome trade, which affects the air in the neighbourhood (9 Rep. 52. Hutt. 135.); or by the neglect or unſkilful management of his phyſician, ſurgeon, or apothecary. (Lord Raym. 214.) For theſe injuries, unaccompanied by force, there is a remedy in damages, by a ſpecial action of *treſpaſs upon the caſe.* Injuries affecting a man's reputation, or good name, are, firſt, by malicious, ſcandalous, and ſlanderous words, tending to his damage and derogation. (See Words and Scandalum *Magnatum;* and Action *upon the caſe.*) A ſecond way of affecting a man's reputation is by printed or written libels, pictures, ſigns, and the like; which ſet him in an odious or ridiculous light, and thereby diminiſh his reputation. (2 Shaw. 314. 11 Mod. 99.) See Libel. A third way of deſtroying or injuring a man's reputation is by preferring malicious indictments or proſecutions againſt him; which, under the maſk of juſtice and public ſpirit, are ſometimes made the engines of private ſpite or enmity. For this, however, the law has given a very adequate remedy in damages, either by an action of conſpiracy (Finch. L. 305.), which cannot be brought but againſt two at the leaſt; or, which is the more uſual way, by a ſpecial action on the caſe for a falſe and malicious proſecution. (F. N. B. 116.) The violation of the right of perſonal liberty is effected by the injury of falſe impriſonment, for which the law has not only decreed a puniſhment, as a heinous public crime, but has alſo given a private reparation to the party; as well by removing the actual confinement for the preſent, as, after it is over, by ſubjecting the wrong doer to a civil action, on account of the damage ſuſtained by the loſs of time and liberty. (See Imprisonment, and False *Impriſonment.*) The injuries that affect the rights of perſonal property, affect it either as it is in poſſeſſion or in action. (See Property.) The former kind of property is liable to two ſpecies of injuries, *viz.* the amotion or deprivation of that poſſeſſion, and the abuſe or damage of the chattels, while the poſſeſſion continues in the legal owner. The deprivation of poſſeſſion comprehends the unjuſt and unlawful taking away, and the unjuſt detention, though the original taking might be lawful. The remedy which the law has provided for the wrongful taking of goods, is the reſtitution of them, with damages for the loſs ſuſtained by ſuch unjuſt invaſion, which is effected by action of "replevin," which ſee. Other remedies for other unlawful taking of a man's goods conſiſt only in recovering a ſatisfaction in damages, by an action of *treſpaſs vi et armis,* or action of *trover* and *converſion,* which ſee reſpectively. For unjuſt detention of another's goods, when the original taking was unlawful, the remedy for the recovery of poſſeſſion is by action of *detinue;* or action of *trover,* which ſee. The remedies given by the law to redreſs damages, which the things detained may have ſuffered, are action of *treſpaſs vi et armis,* where the act is in itſelf immediately injurious to another's property, and accompanied with ſome degree of force; and ſpecial *action on the caſe,* where the act itſelf is indifferent, and the injury only conſequential, and therefore ariſing without any breach of the peace. As to injuries that regard things in *action* only, they pertain to ſuch rights as are founded on, and ariſe from contracts, which may be either *expreſs* or *implied*. The former are *debts*, *covenants*, and *promiſes*; ſee each term: the latter are ſuch as reaſon and juſtice dictate, and which the law preſumes that every man has contracted to perform. Thus it is that every perſon is bound, and hath virtually agreed to pay ſuch particular ſums of money as are charged upon him by the ſentence, or aſſeſſed by the interpretation of the law. A debt is thus contracted, and the defendant is bound to pay it. The ſame reaſoning will apply to all penal ſtatutes, that is, ſuch acts of parliament by which a forfeiture is inflicted for tranſgreſſing the proviſions therein enacted. The party offending muſt pay the forfeiture incurred to ſuch perſons as the law requires. Another claſs of contracts includes thoſe which ariſe from natural reaſon, or the juſt conſtruction of law. (See ASSUMPSIT.) The laſt claſs of contracts, implied by reaſon and conſtruction of law, ariſes upon this ſuppoſition, that every one who undertakes any office or employment, truſt or duty, contracts with thoſe who employ or truſt him, to perform it with integrity, diligence, and ſkill; and if for want of theſe qualities any injury accrues to individuals, they have their remedy in damages by a ſpecial action on the caſe.

Beſides the ſpecial action on the caſe, there is alſo a peculiar remedy, entitled an action of *deceit*, (F. N. B. 95.) to give damages in ſome particular caſes of fraud, and principally where one man does any thing in the name of another, by which he is deceived or injured.

As to thoſe injuries that affect men with regard to their *relative* rights, they may be done to perſons under the four following relations: huſband and wife, parent and child, guardian and ward, maſter and ſervant; and they comprehend in the relation of a huſband, *abduction*, *adultery*, and *beating* or otherwiſe abuſing the wife. In the relation of a parent, the injury is *abduction*, which is remedied by a writ of *raviſhment*, or action of *treſpaſs vi et armis*, *de filio* vel *filia*, *rapto vel abducto*. (F. N. B. 90.) See the other terms above ſpecified.

Having briefly recited the principal injuries that may be offered to *perſonal* property, with their ſeveral remedies by ſuit or action, we ſhall next direct our attention to thoſe injuries which affect that ſpecies of property which the laws of England have denominated *real*. Real injuries, or injuries affecting real rights, are principally the following ſix; *ouſter*, *treſpaſs*, *nuſance*, *waſte*, *ſubtraction*, and *diſturbance*; which ſee reſpectively. Blackſt. Com. b. iii.

INJURIES *of the Head*. Some ſubjects, connected with this highly intereſting part of *ſurgery*, have already been treated of in the preceding volumes of this Cyclopædia. See COMPRESSION; CONCUSSION; and EXTRAVASATION. Here it is incumbent upon us to conſider certain other caſes, which are the conſequence of external violence applied to the head, as wounds and contuſions of the ſcalp; inflammation of the dura mater, and ſuppuration under the cranium; fractures of the ſkull, &c.

Injuries of the Scalp.—Injuries done to the ſcalp by external violence are generally of a more ſerious nature than a ſimilar degree of miſchief done to any other part of the common integuments. Surgical authors have endeavoured to account for this fact by adverting to the prodigious quantity of nervous filaments diſtributed to the ſcalp, the many different parts which compoſe it, its ſtructure, connections, &c. We are not, however, to ſuppoſe every injury of the external coverings of the head dangerous. A mere cut with a ſharp inſtrument uſually heals as favourably in this ſituation as in any other, and often more ſo, perhaps, in conſequence of the great vaſcularity of the ſkin of the head, and the very ſteady manner in which the edges of the wound admit of being kept in contact, ſupported as they are upon the fixed ſurface of the cranium. But punctures, lacerated wounds, and contuſions of the ſcalp, as every experienced ſurgeon well knows, are caſes frequently followed by ſuch ſymptoms as may terminate fatally.

We ſhall paſs over inciſed wounds of the ſcalp, ſince they are attended with no peculiarity, and only require the ſame treatment as ordinary cuts upon any part of the ſurface of the body.

Lacerated wounds of the ſcalp are divided by Mr. Pott into two kinds; *viz.* thoſe in which the ſcalp, though torn, or unequally divided, ſtill keeps its natural ſituation, and is not ſtripped nor ſeparated from the cranium to any conſiderable diſtance beyond the breadth of the wound; and thoſe, in which it is conſiderably detached from the parts it ought to cover.

The firſt of theſe, if ſimple, and not combined with the ſymptoms, or appearances of any other miſchief, do not require any particular or different treatment from what the ſame kind of wounds require on all other parts; but the latter, or thoſe in which the ſcalp is ſeparated and detached from the parts it ought to cover, are not only, by the different methods in which they may be treated, frequently capable of being cured with a conſiderable deal more or leſs eaſe and expedition, but are alſo ſometimes a matter of great conſequence to the health and well-being of the patient.

Not many years ago ſurgeons were accuſtomed to treat this laſt ſort of caſe in a moſt objectionable way. Too haſtily convinced of the impoſſibility of the ſeparated and torn pieces of the ſcalp ever becoming united again, practitioners uſed, without heſitation, to cut them away, ſo as to occaſion a large ſore, requiring a long time to heal, and leaving conſiderable deformity. Far different is the practice of the moſt approved modern ſurgeons, with whom it is an invariable maxim, that the preſervation of the ſcalp ought always to be attempted. The reaſons for this line of conduct are plain and obvious. The detached portions of the ſcalp were formerly cut off, becauſe it was ſuppoſed that they were in ſuch a ſtate as precluded all chance of their union. But the fact is, it can never be foreſeen with certainty whether the detached torn edges of a lacerated wound will ſlough or not. Now, as no harm can ariſe from trying whether they will live and unite; as conſiderable benefit will reſult from the ſucceſs of ſuch an attempt; and, as the exciſion of the part is painful, and productive of no ſolid advantage, even when ſloughing is unavoidable, the method is ſupported neither by reaſon nor experience. Whatever may be the courſe of the caſe, the proceeding is only calculated to cauſe unneceſſary pain, lengthen the time required for the cure, and render deformity, which is uncertain, quite inevitable. The head having been ſhaven round the wound, the torn piece of the ſcalp is to be firſt freed from all dirt and extraneous ſubſtances, and then reſtored as quickly and as perfectly as poſſible to its natural ſituation. Strips of adheſive plaſter fully ſuffice for bringing the parts together without the aſſiſtance of ſutures, which, unleſs abſolutely neceſſary, ought never to be uſed. It has always appeared to us a very beneficial plan to maintain the pieces of the ſcalp cloſely applied to the cranium by means of ſmall lint-compreſſes, bound on with adheſive plaſter. Thus, no cavity will be left for the lodgment of matter, and the parts will have the faireſt opportunity of uniting. Sometimes the looſened ſcalp will unite with the parts from which it was torn and ſeparated, and there will be no other ſore than what ariſes from the impoſſibility of bringing the lips of the wound into ſmooth and immediate contact, the ſcar of which ſore muſt be ſmall in proportion. Sometimes ſuch perfect re-union is not to be obtained; in which caſe matter will be formed and collected in thoſe places where the parts do not coaleſce; but this will not hinder the preſervation of the coverings of the head, the cure being only a little retarded by a few ſmall abſceſſes, and the matter admitting of being let out by one or two ſmall openings.

Occaſionally, the whole ſeparated piece will unite perfectly, eſpecially in young and healthy perſons. In certain inſtances the union will take place in ſome parts, and not in others; and, conſequently, matter will be formed, and require to be diſcharged, perhaps, at ſeveral different points. In other particular caſes, circumſtances, and habits, there will be no union at all, the torn cellular membrane, or the naked aponeuroſis will inflame and become ſloughy, a conſiderable quantity of matter will be collected, and, perhaps, the cranium will be denuded. But even in this caſe, if the ſurgeon takes proper meaſures, and refrains from being too much in a hurry to cut, things will be more proſperous than may be expected. Let him take care to keep the inflammation under by proper means; let him have patience till the matter is fairly and fully formed, and the ſloughs perfectly ſeparated; and when this is accompliſhed, let him make a proper number of dependent openings; and let him, by bandage and other proper management, keep the parts in conſtant contact with each other, and he will often find, that, although he was foiled in his firſt intention of procuring immediate union, yet he will frequently ſucceed in this his ſecond; he will ſtill ſave the ſcalp, ſhorten the cure, and prevent the great deformity ariſing, particularly to women, not only from the ſcar, but from the total loſs of hair.

Many perſons have erroneouſly thought, that, when the pericranium is ſtripped off the cranium by external violence, or is afterwards caſt off, the ſcalp cannot unite to the denuded cranium, which muſt of neceſſity exfoliate. However, theſe notions are now well known to be unfounded. The expoſed part of the ſkull, unleſs much injured by contuſion, or improperly irritated by ſtimulating applications, will generally live, throw out granulations, and become united to the ſeparated ſcalp, without any exfoliation whatever.

Punctured wounds of the ſcalp are more apt than cuts to inflame and give trouble, and are indeed frequently the cauſe of ſevere and alarming ſymptoms.

According to Mr. Pott, if the wound affects the cellular membrane only, and has not reached the aponeuroſis, or pericranium, the inflammation and tumour affect the whole head and face, the ſkin of which wears a yellowiſh caſt, and is ſometimes thick ſet with ſmall bliſters, containing the ſame coloured ſerum; it receives the impreſſion of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour; it is not very painful to the touch, and the eye-lids and ears are always comprehended in the tumefaction, the former of which are ſometimes ſo diſtended as to be cloſed; a feveriſh heat and thirſt generally accompany it; the patient is reſtleſs, has a quick pulſe, and moſt commonly a nauſea and inclination to vomit.

Caſes are moſt diſpoſed to aſſume this form in perſons of bilious habit, the inflammation being in fact eryſipelatous. The diſorder is ſomewhat alarming to look at, but it is not often attended with danger. Mr. Pott remarks, that the wound does, indeed, neither look well, nor yield a kindly diſcharge, while the fever continues; but ſtill it has none of that look which beſpeaks internal miſchief; the ſcalp continues to adhere firmly to the ſkull; nor does the patient ſuffer the tenſive pain, and fatiguing reſtleſſneſs, which generally attend miſchief underneath the ſkull.

Such eryſipelatous inflammation commonly ſoon yields to phlebotomy, lenient purges, and febrifuge medicines, particularly thoſe of the neutral kind. When the inflammation is gone off, it leaves on the ſkin a yellowiſh tint, and a dry ſcurf, which alſo, in time, diſappear. Immediately the diſorder ſubſides, the wound puts on a healthy aſpect, and heals without trouble.

Surgeons muſt carefully diſtinguiſh from the foregoing caſe another kind of eryſipelatous ſwelling and inflammation to which the ſcalp is liable, as one of the effects of inflammation and ſuppuration of the dura mater. In this laſt important diſorder the febrile ſymptoms are much higher, the pulſe harder and more frequent, the anxiety and reſtleſſneſs extremely fatiguing, the pain in the head intenſe; and as, in theſe circumſtances, the ſwelling of the ſcalp is moſt frequently the immediate precurſor of matter forming between the ſkull and dura mater, it is generally attended with irregular ſhiverings, which are not followed by a critical ſweat, nor afford any relief to the patient. When the inflammation is confined to the parts on the outſide of the ſkull, the eryſipelas generally appears within the firſt three or four days; but when the dura mater is affected, it ſeldom comes on till ſeveral days after the accident, when the ſymptomatic fever is got to ſome height. In the ſimple eryſipelas, although the wound be crude and undigeſted, yet it has no other mark of miſchief; the pericranium adheres firmly to the ſkull, and, upon the ceſſation of the fever, all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a ſpongy, glaſſy, unhealthy aſpect, but the pericranium in its neighbourhood ſeparates ſpontaneouſly from the bone, and quits all coheſion with it. In ſhort, ſays Mr. Pott, one is an accident proceeding from a bilious habit, and not indicating any miſchief beyond itſelf; the other is a ſymptom, or a part of a diſeaſe, which is occaſioned by injury done to the membranes of the brain; one portends little or no ill to the patient, and almoſt always ends well; the other implies great hazard, and moſt commonly ends fatally.

When the wound is ſmall, and reaches to the aponeuroſis and pericranium, diſagreeable, and even alarming ſymptoms ſometimes ariſe. In the caſe alluded to, the inflamed ſcalp does not riſe into that degree of tumefaction as in the eryſipelas; neither does it pit, or retain the impreſſion of the fingers of an examiner. It is of a deep red colour, unmixed with the yellow tint of the eryſipelas; it appears tenſe, and is extremely painful to the touch. The ears and eye-lids are ſeldom comprehended in the tumour, though they may partake of the general inflammation of the ſkin. It is generally attended with acute pain in the head, and ſuch a degree of fever as prevents ſleep, and ſometimes brings on delirium. A patient, thus affected, may be more freely bled than one labouring under an eryſipelas. Warm fomentations are proper in both caſes; but emollient poultices, which are forbidden in eryſipelatous diſeaſes, may be employed in the preſent inſtance with much advantage.

In exceedingly urgent caſes, Pott recommends making a diviſion of the wounded part down to the bone, to the extent of half an inch, or an inch, as the beſt means of ſtopping the fever, and preventing the aponeuroſis and pericranium from becoming ſloughy.

Mere *contuſions of the ſcalp*, unattended by fracture, or injury of the parts within the cranium, are not of ſerious importance, conſidered abſtractedly. It frequently happens, that when a ſevere bruiſe has been inflicted on the ſcalp, a large tumour, containing extravaſated blood, quickly riſes upon the head, or blows on this part with ſtones, ſticks, &c. But, notwithſtanding the immenſe disfigurement attending this ſort of accident, if the ſkull and its contents be free from injury, the caſe is not of a dangerous nature. The effuſed blood generally admits of being removed by abſorption, provided the ſurgeon is careful to keep the patient's bowels well open with ſaline purges, and apply to the tumour itſelf linen wet with the ſaturnine lotion, or with a lotion compoſed of ſpirit of wine, vinegar, and the muriate of ammonia. Many ſurgical authors countenance the plan of diſcharging the collection of blood by a ſmall puncture. As far as our obſervations extend, this practice ſhould be avoided in the generality of inſtances. When an opening is made, ſuppuration within the ſwelling becomes inevitable. On the contrary, abſceſſes may frequently be prevented altogether, by allowing the abſorbents to do the office of taking away the effuſed blood, aſſiſted by the means already recommended. It is not to be denied, however, that matter will ſometimes form, and then the method of making an opening for the diſcharge of the contents of the ſwelling is undoubtedly proper.

With regard to thoſe tumours of the ſcalp, which are the conſequence of blows, falls, &c. and which are filled with effuſed blood, J. L. Petit made a remark, which has been repeated by all ſubſequent writers, namely, the facility with which the centre of the ſwelling may be depreſſed, while the circumference ſeems hard and prominent, circumſtances which may eaſily impoſe upon the inexperienced ſurgeon, and lead him to miſtake the caſe for a fracture of the cranium with depreſſion of the bone. If, upon ſuch a ſuppoſition, he immediately makes an inciſion into the tumid ſcalp, he may give the patient a great deal of unneceſſary pain, and endanger his own reputation.

It is obſerved by Mr. Pott, that in this caſe the touch is ſo liable to deception, that recourſe ſhould always be had to other circumſtances and ſymptoms, before an opinion is given. If a perſon, with ſuch tumour occaſioned by a blow, and attended with ſuch appearances and feel, ſeems to labour under dangerous preſſure upon the brain, a diviſion of the ſcalp, in order to enquire into the ſtate of the ſkull, is right and neceſſary; but if the patient is well, or not ſeriouſly affected with any ſymptoms of compreſſion, the mere feel of ſome thing like a fracture, nay, we may add, even the actual exiſtence of a fracture itſelf, will not authoriſe or vindicate cutting the ſcalp.

For an account of the ſymptoms of preſſure on the brain, ſee COMPRESSION and EXTRAVASATION.

Inflammation of the Dura Mater, and Suppuration under the Skull.—The ſymptoms attending an inflamed or ſloughy ſtate of the membranes of the brain, in conſequence of external violence, are all of the febrile kind, and never at firſt imply any unnatural preſſure upon the brain. When, in theſe caſes, the ſymptoms of preſſure come on, it is not until the latter end of the diſeaſe, that is, until a conſiderable quantity of matter is formed, which matter muſt preſs like any other fluid.

The late eminent Mr. Pott has written a moſt able deſcription of the inflammation and ſuppuration of the dura mater from external violence. The following obſervations are chiefly from his pen.

When there is neither fiſſure nor fracture of the ſkull, nor extravaſation, nor commotion underneath it, and the ſcalp is neither conſiderably bruiſed nor wounded, the miſchief is ſeldom diſcovered or attended to for ſome few days. The firſt attack is generally by pain in the part which received the blow. This pain is ſoon extended all over the head, and is attended with a languor or dejection of ſtrength and ſpirits, which are ſoon followed by a nauſea and inclination to vomit, a vertigo or giddineſs, a quick and hard pulſe, and an incapacity of ſleeping. A day or two after this attack, if no means preventive of inflammation are uſed, the part ſtricken generally ſwells, and becomes puffy and tender, but not painful. Neither does the tumour riſe to any conſiderable height, nor ſpread to any great extent. If this tumid part of the ſcalp be now divided, the pericranium will be found of a darkiſh hue, and either quite detached, or very eaſily ſeparable from the ſkull, between which and it will be found a ſmall quantity of a dark-coloured ichor. If the diſorder is ſo advanced, that the pericranium is quite ſeparated from the ſkull, the latter will be found ſomewhat altered in colour from a healthy bone.

From this time the ſymptoms generally advance more haſtily and more apparently; the fever increaſes, the ſkin becomes hotter, the pulſe quicker and harder, the ſleep more diſturbed, the anxiety and reſtleſſneſs more fatiguing; and to theſe, ſays Mr. Pott, are generally added irregular rigours, which are not followed by any critical ſweat, and which, inſtead of relieving the patient, add conſiderably to his ſufferings. If the ſcalp has not been divided, until the ſymptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable; it will be found to be whiter and more dry than a healthy one; or, as Fallopius has obſerved, it will appear rather like dead bone.

There will be more ſanies or fluid under the pericranium, and this membrane will have a more livid aſpect.

In this ſtate of matters, if the dura mater be denuded, it will be found to be detached from the inſide of the cranium, to have loſt its bright ſilver hue, and to be ſmeared over with a kind of mucus or pus. Every hour after this period all the ſymptoms are exaſperated; the head-ache and thirſt become more intenſe, the ſtrength decreaſes, the rigours are more frequent, and, at laſt, convulſive motions, attended in ſome with delirium, in others with paralyſis, or comatoſe ſtupidity, finiſh the tragedy.

If the ſcalp is now divided, a very offenſive diſcoloured fluid will be found lying on the bare and altered cranium. If, at this period, a perforation is made in the bone, matter will be found between it and the dura mater, generally in conſiderable quantity, but different in different caſes and circumſtances. Sometimes it will be in great abundance, and diffuſed over a very large part of the membrane; and ſometimes the quantity will be leſs, and conſequently the ſpace which it occupies ſmaller. Sometimes it lies only on the exterior ſurface of the dura mater; and ſometimes it is between it and the pia mater, or alſo on the ſurface, or in the ſubſtance of the brain.

The foregoing miſchief is entirely the conſequence of the contuſion which the head has ſuffered. But it deſerves attention, that as the inflammation and ſeparation of the dura mater are not *immediate* conſequences of the violence, ſo neither are the ſymptoms immediate, ſeldom coming on until ſome days have paſſed.

We have next to conſider the caſe where the ſcalp has been wounded, either by the accidental violence, or by the ſurgeon making an inciſion immediately afterwards for the examination of the bone. Here the wound will, for ſome little time, have nothing particular about it; but after a few days, any favourable appearances which it may have put on will vaniſh; the ſore will loſe its florid complexion and granulated ſurface; will become pale, glaſſy, and flabby; inſtead of good matter, it will diſcharge only a thin diſcoloured ſanies; the lint with which it is dreſſed, inſtead of coming off eaſily, as in a kindly ſuppurating ſore, will ſtick to all parts of it; and the pericranium

cranium, inſtead of adhering firmly to the bone, will ſeparate from it all round to ſome diſtance from the edges.

This alteration in the face and circumſtances of the ſore is produced merely by the diſeaſed ſtate of the parts underneath the ſkull, as is demonſtrably proved, by obſerving that the bad aſpect of the wound, and the ſpontaneous ſeparation of the pericranium, are always confined to that part which covers the altered or injured portion of the dura mater, and do not at all affect the reſt of the ſcalp; nay, obſerves Mr. Pott, if it has by accident been wounded in any other part, or a portion has been removed from any part where no injury has been done to the dura mater, no ſuch ſeparation will happen. The detachment above will always correſpond to that below, and be found no where elſe.

At firſt the expoſed part of the ſkull appears whiter and more dry than natural, and in proportion as the dura mater ſuppurates or becomes ſloughy, the bone inclines more and more to a kind of purulent hue, or whitiſh yellow. It deſerves notice, likewiſe, that if the blow has occurred near a ſuture, and the ſubject is young, ſuch ſuture often ſeparates ſo as to let through it a looſe painful fungus. At this period alſo the head and face are frequently attacked with eryſipelas.

The above deſcribed effects of certain contuſions of the head are frequently found to accompany fiſſures and undepreſſed fractures of the cranium, as well as extravaſations of fluid, where the bone is entire; and on the other hand, ſays Mr. Pott, all theſe do often happen without the concurrence of this individual miſchief. All this is matter of accident; but let the other circumſtances be what they may, the ſpontaneous ſeparation of the altered pericranium, in conſequence of a ſevere blow, is almoſt always followed by a ſuppuration between the cranium and dura mater; a circumſtance, which Mr. Pott points out as highly worthy of attention in fiſſures and undepreſſed fractures of the ſkull, becauſe it is from this cauſe principally that the bad ſymptoms, and the hazard in ſuch caſes, ariſe.

The ſituation of extravaſated blood within the cranium is often uncertain; but that of inflammation and ſuppuration of the dura mater, in conſequence of external violence, is almoſt ſurely indicated, even when the ſkin is quite free from wound, or other mark of injury, by a puffy, circumſcribed, indolent tumour of the ſcalp, and a ſpontaneous ſeparation of the pericranium from the ſkull under the ſwelling.

It ſhould be underſtood that none of the bad ſymptoms are owing to the ſeceſſion of the pericranium, but to the inflammation of the dura mater. Hence, though the ſcalp may be ſo wounded or torn by any accident, as to leave a part of the ſkull quite bare, the pericranium being ſeparated by the violence, yet if the force has not been ſuch as to affect the dura mater, the alarming train of evils above explained do not follow. Here the beſt practice is to lay down the ſcalp in its natural ſituation again, and give it the opportunity of uniting.

It remains for us to conſider the treatment of the reſpective caſes, where there is either danger of an inflammation of the dura mater coming on, or where the affection actually prevails, attended with the formidable ſymptoms already detailed.

Every man of experience will coincide with Mr. Pott, that of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy, and that if any thing can particularly contribute to the prevention of the ills likely to follow ſevere contuſions of the head, it is this kind of evacuation; but then it muſt be made uſe of in ſuch a manner as to become truly a preventive; that is, it muſt be made uſe of immediately and freely.

There will often be ſome difficulty in perſuading a perſon, who has had what may be called only a knock on the pate, to ſubmit to ſuch diſcipline, eſpecially if he finds himſelf tolerably well: yet, in many inſtances, the timely uſe, or the neglect of this ſingle remedy, makes all the difference between ſafety and fatality. It is true, that by this method patients muſt ſometimes be bled, who would eſcape inflammation of the dura mater without ſuch evacuation; yet, let it be remembered, that the loſs of blood, however unneceſſary in theſe caſes, never endangers life, while it is frequently the means of preſerving it. In ſhort, we muſt agree with Mr. Pott, that if every perſon who meets with a ſevere blow on the head were to be bled, as he undoubtedly ought to be, many a very valuable life would be preſerved, which, for want of this kind of aſſiſtance, is loſt. Acceleration, or hardneſs of pulſe, reſtleſſneſs, anxiety, and any degree of fever, after a ſmart blow on the head, are always to be ſuſpected and attended to. Immediate, plentiful, and repeated evacuations have, in many inſtances, removed theſe complaints in perſons, to whom, Mr. Pott believes, very terrible miſchief would have happened, had not ſuch precaution been uſed. From theſe obſervations, however, let it not be concluded, that early bleeding will always prove a certain preſervative; like all other human means it is fallible; but, if it ſometimes fails, it alſo ſucceeds to a greater extent than any other known plan.

When the inflammation of the dura mater has produced matter under the cranium, the fluid ought to be diſcharged through a perforation of the bone. This operation ought always to be done immediately when the above deſcribed ſymptoms manifeſt the nature of the caſe. The ſpontaneous ſeparation of the dura mater, if attended with general diſorder of the patient, with chillineſs, horripilatio, languor, and fever, was invariably conſidered by Mr. Pott a ſure indication of miſchief underneath, and an urgent reaſon for perforating the bone without delay. In ſome caſes one perforation will ſuffice; in others, more openings muſt be made. This variation will depend upon the ſpace of detached dura mater, and the quantity of matter collected.

The repetition of blood-letting, of cooling laxative medicines, the uſe of antiphlogiſtic remedies, and a moſt ſtrict obſervance of a low diet and regimen, are as indiſpenſably requiſite after trephining as before. The perforation obviates the dangerous effects of the confinement of matter; but it does nothing more; and the inflamed ſtate of the parts under the ſkull ſtill calls for our moſt earneſt attention. See Pott on Injuries of the Head.

Fractures of the Skull.—Whenever the head is ſtricken with a certain degree of violence, the effect is not limited to a vehement concuſſion of this part of the body, or to the bruiſing and wounding of the ſcalp; the bones forming the cranium are alſo liable to be broken. When the weapon, or thing with which the blow is given, preſents an angular or a projecting ſurface, the fracture generally happens where the violence is immediately applied; but it may occur at a different part of the head, when produced by a body of a certain width. The poſſibility of fractures happening in a ſituation more or leſs diſtant from that which received the blow, is explicable on the principle of the unequal reſiſtance offered by the parietes of the cranium at different points of their extent. It is to ſuch caſes that the name of *counter-fiſſures* is given.

In order to explain the manner in which counter-fiſſures are produced, let us ſuppoſe a blow to fall upon the os frontis, with a force equivalent to twenty, which bone, being in the ſituation of the forehead ſomewhat thick, makes a reſiſtance equal to twenty-five. The ſolution of continuity, therefore, cannot happen directly in the place ſtricken; the force is tranſmitted to the orbitar proceſs, a part which is thin, eaſily broken, and only capable of making a reſiſtance expreſſed by twelve; conſequently the violence, though weakened in its tranſmiſſion, is ſtill ſufficient to fracture this laſt proceſs. The foregoing reaſoning coincides with experience. Many fractures of the orbitar proceſſes of the os frontis are met with in practice, while that part of the bone, which forms the forehead, remains free from injury. This firſt ſpecies of counter-fiſſure, though not exactly in the ſituation where the external violence was applied, happens on a part of the ſame bone which received the blow. There are other caſes, where counter-fiſſures occur on ſome bone adjoining that which was ſtricken, notwithſtanding the check which the impulſe muſt experience in croſſing the ſutures. Thus, blows on the parietal bone frequently break the ſquamous portion of the os temporis.

Such counter-fiſſures as happen to a part of the ſkull, diametrically oppoſite the point which received the blow, notwithſtanding the equal thickneſs of the bones in both places, admit of explanation by the imperfect ſpherical form of the cranium. Richerand, Noſog. Chir. tom. 2.

Fractures of the inner table of the ſkull, while the external is ſimply contuſed, are explicable by its great fragility, whence it has alſo been named by ſeveral authors *vitreous.*

Direct fractures, as well as counter-fiſſures, differ in point of ſituation, the extent of the ſolution of continuity, their particular ſhape, and the ſymptoms with which they are followed. Sometimes the crack is exceedingly fine and minute, which caſe is often called a *capillary fiſſure*. Sometimes the edges of the breach are attended with a ſeparation, more or leſs conſiderable. In ſome caſes, the fracture runs in a ſtraight line; in others it is ſtellated. In certain examples, the ſplinters of bone are beaten inwards, and compreſs the brain: theſe inſtances are uſually named *fractures with depreſſion.* On other occaſions, the broken pieces keep their proper level. But even in the latter ſort of caſe, the brain may ſuffer a dangerous degree of preſſure from an extravaſation of blood under the bone, ſuch preſſure, indeed, as may urgently require the application of the trephine. Yet, it ought to be well underſtood, that this operation is not performed becauſe the ſkull is broken, but becauſe the brain is dangerouſly compreſſed by a quantity of extravaſated blood, that lies confined under the bone, and was poured out of veſſels, which were ruptured by the ſame violence as broke the bone itſelf.

Not only may fractures of the ſkull be complicated with extravaſation, they may be conjoined with the effects of concuſſion. Depreſſed fractures are frequently accompanied with an actual laceration of the membranes and ſubſtance of the brain. The recoveries which have been known to follow the moſt terrible wounds of this organ, as detailed in the Memoirs of the French Academy of Surgery, are both curious and ſurpriſing. But, generally ſpeaking, the danger of all injuries of the head is in proportion to the miſchief and violence done to the brain. A fracture of the ſkull, could it be occaſioned, and exiſt without the leaſt irritation and diſturbance of the brain and membranes thereof, would be attended with no ſerious ſymptoms, and, of courſe, would require only ſimple treatment. In ſhort, the breach of continuity would be repaired with callus, juſt like a ſimilar injury in any other bone. It is the nearneſs of the brain, and the manner in which it is affected, either by the depreſſion or inequality of the bone, or by the blow itſelf, which conſtitute at once the importance and danger of all fractures of the cranium. The ignorant and injudicious are apt to think, that becauſe the ſkull is broken, the trepan muſt be employed, as a matter of courſe. Perhaps the doctrines of M. Queſnay, Pott, &c. might ſanction the invariable uſe of the trephine; for, if the argument be allowed, that this operation is proper as a *preventive* of the bad ſymptoms to be apprehended in caſes of fractured ſkulls, there cannot very well be any caſes where the practice would not be juſtifiable. Let not an opinion of ſuch conſequence, however, be taken up too haſtily, and we ſhall preſently adduce convincing reaſons againſt its validity.

We muſt firſt conſider what are the ſymptoms by which the exiſtence of a fracture of the ſkull may be known? It muſt be acknowledged, conſiderable obſcurity prevails in the diagnoſis of ſuch accident, unleſs it ſo happen, that the nature of the caſe admits of being aſcertained by the eye, or the touch. What are termed the *rational* ſymptoms are exceedingly fallacious. When a fracture of the ſkull occurs, attended with a wound of the ſcalp, and a denudation of the broken part of the bone, the ſurgeon may both ſee with his eyes, and feel with his fingers, what has happened. The exiſtence of a fracture may likewiſe be aſcertained by the touch, even when the ſoft parts are entire, if the ſolution of continuity in the bone is ſplintered, or accompanied with a conſiderable depreſſion. When ſeveral of the fragments are entirely detached, a palpable crepitus will often render the nature of the accident ſtill more clear.

Setting out of conſideration ſuch ſymptoms, there are none which can be regarded as characteriſtic of a fracture of the ſkull. Some writers direct us to enquire whether the patient was ſenſible, at the time of receiving the injury, of any noiſe, like that of a pot breaking. But how are we to gain information on this point from patients who are always ſtunned at firſt, and often remain ſenſeleſs and ſpeechleſs a long while afterwards? Other authors lay ſtreſs on the bleeding from the noſe and ears, a circumſtance entirely incidental, or, at moſt, indicative of nothing elſe, than that the head has ſuſtained ſome kind of blow, or concuſſion, without at all informing us of the degree of violence that has been applied. Beſides, every one knows what ſlight ſhocks will cauſe this kind of bleeding in particular perſons, ſo that it cannot be received as a proof that the blow has been very powerful. Even did it prove that the blow has been violent, it would not juſtify the inference, that the ſkull is certainly broken. In ſhort, we may aſſert, that a fracture of the cranium, without depreſſion, without extravaſation, and without concuſſion, is generally not only not productive itſelf of any alarming effects, but is alſo unmarked by any particular ſymptoms. Its exiſtence can only be aſcertained by the eye or the touch; and therefore its diagnoſis is only eaſy, when the injury is expoſed in conſequence of a wound. However, a ſurgeon need not be ſolicitous to find out an undepreſſed fracture; for if ſymptoms demand the application of the trephine, he is to apply it to the bone, whether it is fractured or not; and if theſe ſymptoms are abſent, the fracture itſelf cannot be a juſt reaſon for the operation.

We muſt not take our leave of the diagnoſis of theſe caſes, without cautioning ſurgeons not to be too haſty in pronouncing the ſkull to be fractured. Bloody tumours of the ſcalp often feel ſo much like fractures of the cranium with depreſſion, as to make the moſt experienced men incapable of a poſitive deciſion. Theſe caſes have already been noticed in the preſent article. When the bone is bare, it is poſſible to miſtake a ſuture, or the furrow of a blood-veſſel, for a fracture, and Hippocrates has gained conſiderable honour by the candour with which he acknowledged his having fallen into an error of this kind.

We ſhall conclude this ſubject with a few obſervations on the treatment of fractures of the ſkull. For the relief of theſe caſes, there cannot be a doubt that the uſefulneſs of trepanning has been moſt unreaſonably magnified. The neceſſity of only practiſing this operation when it is abſolutely requiſite, muſt be manifeſt to every one, who reflects, that cutting away a portion of the ſkull is a proceeding by no means free from the hazard of very dangerous conſequences. We have alſo the teſtimony of ſeveral eminent ſurgical writers, that it is an operation, generally ſpeaking, attended with remarkable ill ſucceſs. It is not our intention, however, to endeavour to inſinuate, that the fatal terminations are not chiefly aſcribable to the ſerious miſchief which commonly exiſts when the operation is performed. Be this as it may, we cannot help looking upon trepanning as a thing, to which recourſe ſhould never be had without ſtrong and urgent reaſon. Deſault, the moſt eminent of the modern French ſurgeons, entirely abandoned the operation in the latter years of his practice, as he found conſiderable ſucceſs ariſe from the employment of evacuations. "C'eſt une obſervation fort ancienne, que le peu de ſuccès de l'opération du trépan pratiquée à l'Hôtel-Dieu de Paris ; ſoit, que l'air des ſalles, vicié par le grand nombre d'individus, qui s'y trouvent raſſemblés, ou par l'humidité dont le voiſinage de la rivière le charge conſtamment, exerce ſur la place, que ſuccède l'opération, ou ſur les membranes du cerveau miſes à nu, une influence délétere, ſoit que ce fait conſtant dépende d'une autre cauſe ignorée, l'opération du trepan eſt preſque toujours ſuivie de la mort des individus." Richerand, Noſographie Chirurgicale, tom. ii. p. 266. Edit. 2.

That the operation of trepanning is itſelf not exempt from ſerious danger we moſt firmly believe. We have ſeen it prove fatal, when performed with a view of relieving a violent inveterate head-ache. Yet we cannot bring our mind to believe, that Deſault was right in rejecting the operation altogether. There certainly are caſes in which it may be the means of preſervation as well as others, in which it may exaſperate circumſtances and render them fatal.

We have noticed that, in fractures of the ſkull, the operation of trepanning was adviſed by Pott, as a *preventive* of ill conſequences. It gives us pleaſure to ſtate, that this practice is now never adopted by the moſt eminent ſurgeons in this country, great as their veneration is for ſo diſtinguiſhed an authority. Many modern writers of the higheſt reputation have forcibly remonſtrated againſt the method, as M. Deſault, of Paris ; Mr. Deaſe, of Dublin ; Mr. John Bell, of Edinburgh ; and Mr. Abernethy, of London.

The reader cannot be ſurpriſed, that fractures without depreſſion are not, abſtractedly conſidered, a juſt cauſe for trepanning, when he is informed, that the ſkull is often broken and depreſſed, and yet the ſymptoms may not be ſuch as to demand the operation, and the patient has the beſt chance of recovery when it is not performed. The more the preſent ſubject is ſtudied, the greater will be the conviction, that there is only one genuine reaſon for trepanning, and that is, when ſymptoms of a dangerous degree of preſſure on the brain exiſt, which ſymptoms are enumerated under the head of Extravasation. When they prevail, the operation is to be done, whether the ſkull is broken or not ; whether it be depreſſed or retain its proper level.

Mr. Abernethy has related ſeveral caſes of fracture of the cranium with depreſſion, which terminated favourably, although no operation was performed. This judicious ſurgeon thinks, that theſe caſes, as well as a great many others on record, prove, that a ſlight degree of preſſure does not derange the functions of the brain for a limited time after its application ; and all thoſe patients whom he had an opportunity of knowing for any length of time after the accident, continued as well as if nothing of the kind had happened to them. In Mr. Hill's Caſes in Surgery, two inſtances of this ſort are related, and Mr. Hill knew both the patients for many years afterwards ; yet no inconvenience aroſe. Indeed, it is not eaſy to conceive that the preſſure which cauſed no ill effects at a time when the contents of the cranium filled its cavity entirely, ſhould afterwards prove injurious when they have adapted themſelves to its altered ſize and ſhape. Severe illneſs, it muſt be confeſſed, does often intervene between the receipt of the injury and the time of recovery ; and many ſurgeons might be inclined to attribute this to the preſſure on the brain ; but it occurs quite as formidably when the depreſſed portion is elevated. If a ſurgeon, prepoſſeſſed with the opinion, that elevation of the bone is neceſſary in every inſtance of fracture of the ſkull with depreſſion, ſhould have acted upon this opinion in ſeveral of the caſes which Mr. Abernethy has related, and afterwards have employed proper evacuations, the patients would probably have had no fatal ſymptoms, and the recoveries would naturally have been imputed to the particular mode of treatment ; yet theſe caſes ended well without any operation.

It cannot be too often repeated, that the neceſſity of trepanning depends entirely on the urgency of the ſymptoms, which are known to proceed from the exiſtence of preſſure on the brain. (See Extravasation.) To trepan the ſkull merely becauſe it is broken, is as abſurd as to cut the arm becauſe it is fractured : it is only adding one ſpecies of violence to another. We have ſeen that, even when the fracture is depreſſed, it does not neceſſarily follow that the operation is proper : in fact, it is always improper, unleſs there are evident ſigns that the degree of preſſure, thus produced, is the cauſe of exiſting dangerous ſymptoms.

If, then, fractures of the cranium with depreſſion do not invariably require trepanning, it may readily be conceived, that the operation muſt be ſtill leſs frequently neceſſary when the fracture is undepreſſed. In ſuch caſe, indeed, the fracture itſelf can never demand this proceeding. But, nevertheleſs, it may be right and indiſpenſable on other accounts, ſince the brain may at the ſame time be dangerouſly compreſſed by an extravaſation of blood, or, in the courſe of the diſorder, by matter formed under the ſkull in conſequence of inflammation. However, it ſhould be well underſtood, that the inflammation and ſuppuration of the parts beneath the ſkull, which Mr. Pott was ſo anxious to *prevent* by trepanning early, do not ariſe from the occurrence of a breach in the cranium, but are chiefly, if not altogether, the conſequences of the ſame violence, which was the occaſion of the fracture. Hence, it is obvious, that removing a portion of the bone cannot have the leaſt tendency to prevent the inflammation and ſuppuration, which muſt inevitably reſult from the external violence that was firſt applied to the head ; but, on the contrary, ſuch a removal being an additional violence, muſt rather have the effect of increaſing the unavoidable inflammatory miſchief.

A fracture of the ſkull, unattended with urgent ſymptoms, and not brought into the ſurgeon's view by any accidental wound of the integuments, often remains for ever undiſcovered and unknown ; and as no benefit could ariſe from laying it bare by an inciſion, ſuch practice ſhould never be adopted. The practitioner ought only to make himſelf officious in this way, when he can accompliſh by it ſome better object than the merely ſatisfying his own curioſity. Now, ſince the removal of preſſure off the ſurface of the brain is the only admiſſible reaſon for ever perforating the cranium, and ſince dividing the ſcalp cannot be uſeful, unleſs preparatory to ſuch operation, it is clear that neither the one nor the other ſhould ever be done, excepting ſuch ſymptoms exiſt as unequivocally denote the prevalence of a dangerous degree of preſſure on the brain, cauſed either by matter, extravaſated blood, or depreſſed portion of the ſkull.

The true mode of *preventing* the bad effects frequently following, but not ariſing from ſimple fractures of the ſkull, (by which we mean caſes unaccompanied by urgent ſymptoms of preſſure,) is not to trepan, but to put in practice all kinds of antiphlogiſtic means. For this purpoſe, let the patient be repeatedly and copiouſly bled, both in the arm and temporal arteries; let him be properly purged; give him antimonials; keep him on the loweſt diet; let him remain in the moſt quiet ſituation poſſible; and if, notwithſtanding ſuch ſteps, the ſymptoms of inflammation of the brain continue to increaſe, let his head be ſhaven, and a large bliſter be applied to it. When, in ſpite of all theſe meaſures, matter forms under the cranium, attended with ſymptoms of preſſure, a puffy tumour of the injured part of the ſcalp, or thoſe changes of the wound (if there be one), which Mr. Pott has ſo excellently deſcribed, and we have already related; not a moment ſhould be loſt in delaying to perforate the bone with a trephine, ſo as to give vent to the matter collected underneath.

Before concluding, we have one important caution to offer, which is, in all caſes of injuries of the head from external violence, to continue an antiphlogiſtic regimen at leaſt a month after any ſerious accident of this deſcription; for it is by no means uncommon for inflammation of the brain to follow injuries of the head a very conſiderable time after the patients have had reaſon to fancy themſelves in perfect ſafety. Pott on Injuries of the Head; Diſeaſe on Wounds of the Head: Hill's Caſes in Surgery; Abernethy on Injuries of the Head; Cooper's Dictionary of Practical Surgery, &c.

Other ſubjects, immediately connected with the preceding, will be found under the articles COMPRESSION, CONCUSSION, EXTRAVASATION, and TREPANNING.

INK, a liquor wherewith to write on paper or parchment.

INK, *Printing*. See PRINTING.

INK, *Writing*, is commonly made of copperas and galls, and gum arabic; but other aſtringent plants may ſerve the ſame purpoſe; ſuch as oak-bark, red roſes, logwood, or ſumach. Mr. Boyle ſeems to doubt whether all aſtringent vegetables will do the ſame.

Many are the preparations and methods of compounding the materials for making of writing ink. For many years the ink moſt generally uſed by European writers has been the infuſion of galls and other aſtringent vegetables, containing gallic-acid, rendered black by ſulphate of iron, and thickened by the addition of a little gum or ſugar. This compoſition, however, is liable to fade; but ſince the diſcovery of the method of totally diſcharging the traces of common ink by the application of the oxigenated muriatic acid, more ſerious conſequences are to be apprehended from the univerſal uſe of the common atramentous fluid, than the decay of its colour from age; for it is well known that, while the ſulphate of iron remains on the paper, the colour of the writing may be reſtored by waſhing the MS. with freſh infuſion of galls. We have ſeveral receipts in Nicholſon's Philoſophical Journal, vol. iv. p. 479, 4to., for compoſing ink capable of reſiſting the oxigenated muriatic acid.

Macquer, in the Chemical Dictionary, gives the following receipt for making good ink. In four French pints of common water or beer, let a pound of bruiſed galls be infuſed twenty-four hours without boiling; to this add ſix ounces of gum arabic; and when the gum is diſſolved, ſix ounces of green vitriol, which will ſoon give it the black colour; the liquor is then to be ſtrained through a hair-ſieve.

The following method has been recommended by experience, and is eaſily and ſpeedily practiſed. To a gallon of boiling water, put ſix ounces of blue galls, groſsly pounded, and three ounces of copperas; ſtir the mixture well together, and then add ſix ounces of gum arabic pounded. After ſtirring the whole thoroughly, leave it to ſettle, and the next day ſtrain it off from the dregs for uſe. See IRIS *lutea paluſtris*.

The following compoſition will make a very good black writing ink. Take a gallon of ſoft water, and boil in it a pound of chips of logwood for about half an hour; pour the decoction boiling hot on a pound of the beſt Aleppo galls powdered, and two ounces of pomegranate peels, put into a proper veſſel. After having ſtirred them well together with a wooden ſpatula, place them in the ſunſhine in ſummer, or within the warmth of any fire in winter, for three or four days, ſtirring the mixture occaſionally; then add half a pound of green vitriol powdered, and let the mixture remain four or five days more, occaſionally ſtirring it; and then add four ounces of gum arabic diſſolved in a quart of boiling water; and after the ink has ſettled, ſtrain it off through a coarſe linen cloth, and keep it well ſtopped for uſe.

Mr. Delaval in his "Treatiſe on Colours," p. 37. informs us, that with an infuſion of galls and iron filings, he had not only made an exceedingly black and durable ink, but by means of it, without the addition of any acid, dyed ſilk and woollen cloth of a good and laſting black. But this kind of ink, though the colour is far ſuperior to that of any other, may be eaſily diſcharged, either by the ſmalleſt quantity of any acid, or even by ſimple water; becauſe it doth not penetrate the paper in ſuch a manner as is neceſſary to preſerve it from the inſtantaneous action of the acid or of the water. During the action of the infuſion of galls upon the iron in making this kind of ink, a very conſiderable effervеſcence takes place, and a quantity of air is diſcharged, the nature of which has not yet been examined.

Many of the more volatile kinds of oil may be uſed in writing, if reduced to a proper conſiſtence by the addition of gum or reſin. Tolerable ink may be made by diſſolving 30 grains of common reſin in 90 grains of oil of turpentine, and tempering the ſolution with 17½ grains of lamp-black, and 2½ of indigo. In a dry ſtate, this compoſition reſiſts the action of water, but not of ſpirit. Copal is much ſuperior to reſin; it will diſſolve in only few liquids. It may be diſſolved, however, in oil of lavender. The only inconvenience attending the uſe of copal in the compoſition of ink is, that it is ſoluble at a low temperature. Ink may be compoſed of oil of lavender, copal, and lamp-black in the manner following: Take oil of lavender 200 grains, copal, in powder, 25 grains, and lamp-black from 2½ to 3 grains. With the aſſiſtance of a gentle heat, diſſolve the copal in the oil of lavender in a ſmall glaſs phial, and then mix the lamp-black with the ſolution upon a marble ſlab, or other ſmooth ſurface. Put the compoſition into the bottle, and keep it from the air. After the repoſe of ſome hours, the ink muſt be well ſhaken, and ſtirred with a piece of wire before it is uſed; if it be too thick, it muſt be diluted with a little oil of lavender, oil of turpentine, or alcohol. The facility of writing with this compoſition depends much on the quantity of the colouring matter. Nicholſon's Journal, vol. ii. 8vo.

As the duration of records, and other valuable writings, depends much on the goodneſs of the ink employed, Dr. Lewis has thought this ſubject worthy of his attention. The chief imperfection of common inks is, that they decay in time, and at laſt the writing becomes inviſible. From experiments made by that author, he infers, that the decay of inks is chiefly owing to a deficiency of galls; that the galls are the moſt periſhable ingredient, the quantity of theſe, which gives the greateſt blackneſs at firſt (which is about equal parts with the vitriol) being inſufficient to maintain the colour; that for a durable ink, the quantity of galls cannot be much leſs than three times that of the vitriol; that it cannot be much greater without leſſening the blackneſs of the ink; that by diminiſhing the quantity of water, the ink was rendered blacker and more durable; that diſtilled water, rain water, and hard ſpring-water, had the ſame effects; that white wine produced a deeper black colour than water; that the colour produced by vinegar was deeper than that by wine; that proof ſpirit extracted only a reddiſh-brown tinge, and rectified ſpirit a paler brown; that the laſt mentioned tinctures ſunk into, and ſpread upon the paper; and hence the impropriety of adding ſpirit of wine to ink, as is frequently directed, to prevent mouldineſs or freezing; that other aſtringents, as oak bark, biſtort, ſloe-bark, &c. were not ſo effectual as galls, nor gave ſo good a black, the colour produced by moſt of theſe, excepting oak-bark, being greeniſh; that the juice of ſloes did not produce a black colour with martial vitriol; but that, nevertheleſs, the writing made with it became black, and was found to be more durable than common ink; that inks made with ſaturated ſolutions of iron in nitrous, marine, acetous acids, in tartar, or in lemon juice, were much inferior to the ink made with martial vitriol; that the colour of ink was depraved by adding quicklime, which was done with an intention of deſtroying any ſuperabundant acid which might be ſuppoſed to be the cauſe of the loſs of the colour of the ink; that the beſt method of preventing the effects of this ſuperabundant acid is probably by adding pieces of iron to engage it; and that this conjecture was confirmed by an inſtance the author had heard, of the great durability of the colour of an ink in which pieces of iron had been long immerſed; and laſtly, that a decoction of logwood uſed inſtead of water, ſenſibly improved both the beauty and deepneſs of the black, without diſpoſing it to fade. The ſame author obſerves, that the addition of gum arabic is not only uſeful, by keeping the colouring matter ſuſpended in the fluid, but alſo by preventing the ink from ſpreading, by which means a greater quantity of it is collected on each ſtroke of the pen. Sugar, which is ſometimes added to inks, was found to be much leſs effectual than gums, and to have the inconvenience of preventing the drying of the ink. The colour of ink is found to be greatly injured, by keeping the ink in veſſels made of copper, or of lead, and probably of any other metal excepting iron, which the vitriolic acid can diſſolve. The foregoing experiments point out for the beſt proportions of the ingredients for ink; one part of green vitriol, one part of powdered logwood, and three parts of powdered Aleppo, or blue galls. The beſt menſtruum appears to be vinegar or white wine, though for common uſe water is ſufficient. If the ink be required to be of a full colour, a quart, or at moſt three pints, of liquor may be allowed to three ounces of galls, and to one ounce of each of the other two ingredients. Half an ounce of gum may be added to each pint of the liquor; though the more gum we can employ, conſiſtently with due freedom of writing, it is probable that the ink will be the more durable. The ingredients may be all put together at once in a convenient veſſel, and well ſhaken four or five times each day. In ten or twelve days the ink will be fit for uſe, though it will improve by remaining longer on the ingredients; or it may be made more expeditiouſly, by adding the gum and vitriol to a decoction of galls and logwood in the menſtruum. To the ink, after it has been ſeparated from the feculencies, ſome coarſe powder of galls, from which the fine duſt has been ſifted, together with one or two pieces of iron, may be added, by which its durability will be ſecured.

It has been often remarked, ſays the ſame ingenious writer, that the inks uſed in former times were far more durable than thoſe of later years; many modern records being more decayed than manuſcripts of much greater antiquity, of which we have inſtances in the Letters of Camillo Paderni, publiſhed in the Philoſophical Tranſactions for 1753 and 1754. Dr. Lewis made ſeveral experiments, in order to recover the compoſition of this durable ink. Inſtead of oil which is uſed in the printers' ink, he mixed both lamp-black and ivory-black with a ſolution of gum arabic; this liquor wrote of a fine black colour, but when dry, it rubbed off entirely by moiſture. Concluding, therefore, that the colour could not be ſufficiently fixed on paper without an oily cement, and as oils are made miſcible with watery fluids by the intervention of gum, he mixed ſome of the ſofter printers' varniſh with about half its weight of a thick mucilage of gum arabic, working them well together in a mortar, and beat this maſs with lamp-black, adding water by little and little, and continuing the rubbing, till the mixture became of a due conſiſtence for writing. This produced characters of a full browniſh black colour, which could not be diſcharged by rubbing, nor waſhed out ſo readily as the foregoing. Inſtead of the printers' varniſh, or boiled oil, linſeed-oil was mixed in the ſame manner with mucilage and lamp-black, and the mixture diluted with water; and the ink thus obtained was much the ſame as the other. To prevent the diſcharge by water, ſome of the more ſinking kinds of paper, or common paper made damp as for printing, muſt be uſed, which will admit the ink to ſink a little into its ſubſtance; and thus the characters will be as fixed as can be deſired. Such Dr. Lewis found to be the ancient inks, that were ſo durable. Pliny and Vitruvius expreſsly mention the preparation of ſoot, or lamp-black, and the compoſition of writing ink from lamp-black and gum. Dioſcorides ſets down the proportion of three ounces of the ſoot to one of gum. This mixture was formed into cakes or rolls, and dried in the ſun, which were occaſionally tempered with water, as the Indian ink is with us for painting. The ancients were ſenſible that theſe inks were liable to be diſcharged by water, and endeavoured to obviate this imperfection, according to Pliny, by uſing vinegar, inſtead of water, for tempering the mixture of lamp black and gum, which promotes the ſinking into the paper. After all, none of theſe inks can be diſcharged otherwiſe than by deſign; which is the caſe with reſpect to the vitriolic inks, and thoſe of printed books and copper-plates.

In the courſe of Dr. Lewis's experiments, a farther improvement occurred to him, which was that of uſing the common vitriolic ink, inſtead of water, for tempering the ancient mixture of gum and lamp-black. By this method the writings will have the durability of thoſe of former times, with all the advantage that reſults from the vitriolic ink fixing itſelf in the paper. Common writing ink may, in many caſes, be improved by a ſmall addition of the ancient compoſition, or of the common Indian ink. Lewis's Commerce of Arts, &c. § 16.

Mr. Aſtle, in his "Origin of Alphabetical Writing," inculcates the neceſſity of making ink durable; and for this purpoſe ſuggeſts a compariſon of the rolls and records that have been written from the 15th century to the end of the 17th, with the writings that remain from the 5th to the 12th centuries. Theſe are in excellent preſervation; but the former, though of more modern date, are defaced to ſuch a degree that they are ſcarcely viſible. Mr. Aſtle agrees with Dr. Lewis in the opinion, that the ancient inks were compoſed of ſoot or ivory black inſtead of the galls, copperas, and gums, which form the compoſition of our's. Beſides their black ink, the ancients uſed various other colours, as red, gold and ſilver, purple, &c. Green ink was frequently uſed in Latin MSS., eſpecially in the latter ages: and it was frequently employed in ſignatures by the guardians of the Greek emperors till their wards were of age. Blue or yellow ink was ſeldom uſed except in MSS., but, according to Mr. Aſtle, the yellow has not been much in uſe for theſe 600 years. Some kinds of characters, particularly the metallic, were burniſhed. Wax was uſed by the Latins and Greeks as a varniſh, eſpecially by the former, and particularly in the 9th century. This continued a long time in vogue. Dr. (ſir Charles) Blagden, in the Phil. Tranſ. vol. lxxvii. p. 451, &c. has propoſed a new method of recovering the legibility of decayed writings. With this view he made ſome experiments on parchment and vellum MSS., with which he was furniſhed by Mr. Aſtle, employing thoſe chemical re-agents which ſeemed beſt adapted to his purpoſe, *viz.* alkalies, both ſimple and phlogiſticated, the mineral acids, and infuſion of galls. The general reſult ſhewed, that the ink anciently uſed, at leaſt in theſe MSS., was of the ſame nature as the preſent; and the greater durability of the more ancient inks appeared to depend very much on a better preparation of the material upon which the writing was made, *viz.* the parchment or vellum. He ſuſpected, however, that the ancient inks contained a rather leſs proportion of iron than the more modern; and perhaps more gum was uſed then, or poſſibly they were waſhed over with ſome kind of varniſh, though not ſuch as gave any gloſs. It occurred to our author, in the courſe of his experiments, that perhaps one of the beſt methods of reſtoring legibility to decayed writings might be to join phlogiſticated alkali with the remaining calx of iron. In order to bring this idea to the teſt, he made ſeveral experiments, for which we refer to his paper, ubi ſupra. The method now commonly practiſed to reſtore old writings is the wetting of them with an infuſion of galls in white wine. This has certainly a great effect: but, like the phlogiſticated alkali, it is apt to ſtain the ſubſtance in which the writing was made. Sir Charles Blagden ſuggeſts, that a phlogiſticated alkali, better adapted to this purpoſe than the common, might be prepared, by rendering it as free as poſſible from iron, diluting it to a certain degree, or ſubſtitutng the volatile alkali for the fixed. This would ſerve to bring out a prodigious body of colour upon letters which were before ſo pale as to be almoſt inviſible, and it would be preferable to the infuſion of galls in this reſpect, that it produces its effect immediately, and may be confined to thoſe letters only for which ſuch aſſiſtance is wanted.

In the "Monthly Review" of the volume of Tranſactions above cited, the following method is propoſed for preventing ink from decaying. It conſiſts in waſhing over the paper on which the writing is to be made with the colouring matter of Pruſſian blue; and by writing upon it afterwards with common ink, a ground of Pruſſian blue is formed under every ſtroke; which will remain ſtrong after the black has been decayed by the weather, or deſtroyed by acids. The ink will thus bear a larger proportion of vitriol at firſt, and will have the advantage of appearing blacker when firſt written.

INK *Powder* may be prepared, by infuſing a pound of galls powdered, and three ounces of pomegranate-peels, in a gallon of ſoft water for a week, in a gentle heat; and then ſtraining off the fluid through a coarſe linen cloth. Add to it eight ounces of vitriol diſſolved in a quart of water, and let them remain for a day or two; preparing in the mean time a decoction of logwood, by boiling a pound of the chips in a gallon of water, till one-third be waſted, and then ſtraining the remaining fluid while it is hot. Mix this decoction and the ſolution of galls and vitriol together, and add five ounces of gum arabic, and then evaporate the mixture over a common fire to about two quarts; when the remainder muſt be put into a veſſel proper for that purpoſe, and reduced to dryneſs in *balneo Mariæ*, i. e. by hanging the veſſel in boiling water. The remaining maſs, after the fluid is wholly exhaled, muſt be well powdered; and when it is wanted for uſe, may be converted into ink by the addition of water.

A portable or extemporaneous ink may be made without galls or vitriol, by mixing half a pound of honey and the yolk of an egg, adding two drams of gum arabic finely levigated, and thickening the whole with lamp-black to the conſiſtence of a ſtiff paſte; which being put to a proper quantity of water, may be uſed as an ink.

INK, *Indian*, or *Chineſe*, is an admirable compoſition, in vain attempted to be imitated in Europe. It is not fluid, like our writing inks, but ſolid, like our mineral colours, though much lighter. They make it of all figures, but the moſt uſual is rectangular, about a quarter of an inch thick. Some of the ſticks are gilt with figures of dragons, birds, flowers, &c. In order to do this, they have little wooden moulds, ſo curiouſly wrought, that we could hardly equal them in metals.

To uſe this ink, there muſt be a little hollow marble, or other ſtone, with water in it, on which the ſtick of ink muſt be ground, till the water becomes of a ſufficient blackneſs. It makes a very black ſhining ink; and though it be apt to ſink when the paper is thin, yet it never runs or ſpreads; ſo that the letters are always ſmooth, and evenly terminated, how big ſoever they be. It is of great uſe in deſigning, becauſe it may be weakened or diminiſhed to any degree; and there is abundance of things which cannot be repreſented to the life without it.

From an analyſis of this ink, Dr. Lewis concludes that it contains an animal ſubſtance ſoluble in water, and conſiſts of a black powder, mixed with ſome animal glue. He tried to imitate it, by mixing ſome lamp-black, prepared from linſeed-oil, by hanging a large copper pan over the flame of a lamp to receive its ſmoke with as much melted glue as gave it ſufficient tenacity for being formed into cakes. Theſe cakes, when dry, anſwered as well as the genuine Indian ink, in regard both to the colour, and the freedom and ſmoothneſs of working. Ivory black, and other charcoal blacks, levigated very fine, had the ſame effect with the lamp-black. It appears from three receipts for the preparation of Indian ink, in Du Halde's Hiſtory of China, that the colouring material is lamp-black, to which is added, in one of them, a quantity of horſe-cheſnuts, burnt till the ſmoke ceaſes. The conglutinating matter, in one of the preſcriptions, isa thin ſize of neat's leather; in another, a ſolution of gum tragacanth, and in the other, a mixture of ſize, with a decoction of certain vegetables, unknown to us. Du Halde obſerves, that the Chineſe have inks of different goodneſs and price; that the moſt eſſential difference proceeds from the quality of the lamp-black, and that the beſt is the ſoot of oil, burnt in lamps, in apartments fitted up for this purpoſe.

The Chineſe have often attempted to uſe this in their porcelain, to give the colour of black to the figure traced on white veſſels, but it has been a vain attempt; for however beautiful and ſtrong the figures might appear when firſt laid on, and even when the veſſels were dried, it all diſappeared on the baking, and they came out quite white as they were put in. The colours for this uſe muſt be ſuch as can penetrate the varniſh, and endure the fire. Mineral colours are found to have theſe qualities, and theſe alone therefore are to be employed; ſuch light ones as this black burning off from the ſurface, and wholly diſappearing. Obſ. ſur les Coûtumes de l' Aſie, p. 329.

Ink is alſo an appellation given to any coloured liquor uſed in the ſame manner as black ink; as red, green, blue, yellow, &c. inks. *Red* writing ink is prepared by infuſing a quarter of a pound of the raſpings of Brazil wood for two or three days in vinegar; boiling the infuſion for an hour over a gentle fire, and afterwards filtering it, while hot, through paper laid in an earthen cullender; then put it again over the fire, and diſſolve in it, firſt, half an ounce of gum arabic, and afterwards alum, and white ſugar, of each half an ounce. Red ink may be alſo made of vermilion, by beating together the glair of four eggs, a tea-ſpoonful of white ſugar, or ſugar-candy, powdered, and as much ſpirit of wine, till they be of the conſiſtence of oil; then adding ſuch a proportion of vermilion as will produce a red colour of ſufficient ſtrength; the mixture ſhould be kept in a ſmall phial, or well-ſtopt ink bottle, and well ſhook before it be uſed. Gum-water is often uſed inſtead of the glair of eggs; but thin ſize made of iſinglaſs, with a little honey, is much better for the purpoſe. Red ink may be made by tempering the ſolution of copal with red ſulphuret of mercury, *e.g.* take of oil of lavender, 120 grains, copal, in powder, 17 grains, and red ſulphuret of mercury, 60 grains, diſſolve the copal in the oil, and then mix the ſulphuret with the ſolution upon a ſmooth ſurface. This, and alſo the black ink made with copal, poſſeſs a permanent colour, and other eſſential properties of the ink uſed in printing. The oil of lavender being diſſipated with a gentle heat, the colour is left on the paper ſurrounded with copal, a ſubſtance inſoluble in water, in ſpirits, in acids, or in alkaline ſolutions.

For red printing ink, ſee Printing.

Green ink may be made, by putting an ounce of powdered verdigris to a quart of vinegar, and ſtraining the fluid, after it has ſtood two or three days: or, inſtead of this, the cryſtals of verdigris diſſolved in water will anſwer the purpoſe; then diſſolve in a pint of either of theſe ſolutions, five drams of gum arabic, and two drams of white ſugar.

Blue ink is made by grinding indigo with honey and the white of eggs, and making it fluid with water.

Yellow ink is made by an infuſion of ſaffron in water, with a little alum and gum arabic: or, by boiling two ounces of Avignon, or French berries, in a quart of water, with half an ounce of alum, till one-third of the fluid be evaporated, and then diſſolving in it two drams of gum arabic, and one dram of ſugar, and afterwards a dram of powdered alum.

In general, inks of all colours may be made by uſing a ſtrong decoction of the ingredients uſed for dyeing, mixed with a little alum and gum arabic. See the ſeveral colour Blue, Green, &c.

Inks, *Sympathetic*, or *Secret*. Every ſort of liquor with which a perſon may write, ſo that the letters do not appear till there is ſome particular means uſed to give them a colour different from that of the paper, is called by the name of *ſympathetic* ink; and of this there are a great many kinds deſcribed in the writings of Baptiſta Porta, Lemery, and other authors.

All theſe inks may be regularly diſtributed into different claſſes, according to the different means which are to be uſed to make them appear; and theſe are in general the four following. 1. By giving a new liquor, or the vapour of new liquor, a place on the paper, on which the letters are written with the natural inviſible ink. 2. By expoſing the paper to the air, by which means the letters at firſt inviſible will appear. 3. By paſſing gently over the letters a matter of ſome remarkable colour reduced to fine powder. And 4. By expoſing the paper to the fire.

This laſt is by much the beſt method, and is ſo general, that it may be prudently uſed to all papers ſuſpected of containing any ſecret writing, as it ſeldom fails to diſcover it. All the common inks of this kind, however, when they have been once made to appear, either by fire or by any other method, can never be made to diſappear again; but there is one kind deſcribed by Mr. Hellot, in the Memoirs of the Academy of Sciences at Paris, and ſince tried many times with us, and elſewhere, which, though the letters it gives are in themſelves inviſible, and appear like thoſe of ſome other of theſe inks, on their being held to the fire, yet they after that will fade and diſappear on the paper again, and may be reproduced in this manner ſeveral times. This, therefore, is the firſt known ink of a fifth general claſs, of which future reſearches may diſcover perhaps more.

Of the firſt claſs of ſympathetic inks, or thoſe which do not appear till the paper on which they are written be made to imbibe another liquor, or the vapour of another liquor, are the following kinds.

To two or three parts of unſlaked lime put one of yellow orpiment; powder and mix the two, adding fifteen or ſixteen times as much water as there was orpiment; ſtop up the phial with a cork and bladder, and ſet it in warm embers; ſhake the phial now and then for five hours, and warily decant the clear part, or rather filtrate it. In the room of this preparation may be uſed a ſaturated ſolution of common brimſtone, made by boiling the brimſtone either with quicklime, or in ſtrong alkaline ley. In the mean time, burn a piece of cork thoroughly, and when well inflamed, quench it in common water, or rather in brandy. Being thus reduced into a friable coal, grind it with fair water, wherein gum arabic has been diſſolved; and it will make a liquor as black as the common ink.

While theſe are doing, diſſolve, in three times as much diſtilled or ſtrong vinegar, over warm embers, a quantity of red lead, or of ſaccharum ſaturni, in thrice the quantity of water, for three or four hours, or till the liquor have a ſweet taſte. This liquor will be as clear as common water. Solutions of lead in aquafortis anſwer the ſame end, except that, when written with, they are apt to corrode the paper.

The liquors thus prepared, write any thing on paper with this laſt ſort, dry it, and nothing will appear. Over the place, write what you pleaſe with the ſecond liquor: it will appear as if written with common ink: when dry, dip a ſmall piece of rag or ſpunge, in the firſt liquor, rub it over the written place, and the black writing will vaniſh; and that wrote with the inviſible ink will appear black and legible.

Again, take a book four or five inches thick, and on the firſt leaf write any thing with the laſt liquor; turn to the other end of the book, and rub there with a rag, dipt in the firſt liquor, on that part, as near as you can gueſs, oppoſite to the writing, and leave alſo the rag there, clapping a paper over it; then nimbly ſhutting the book, ſtrike four or five ſmart ſtrokes thereon with your hand, and turning the other ſide uppermoſt, clap it into a preſs, or lay it under a good weight for a quarter of an hour, or even half that time; then will the writing done with the inviſible ink be found legible there.

The above operation may be varied, by writing the inviſible characters with the ſolution of biſmuth in nitrous acid, and expoſing them to the vapours of liver of ſulphur, or moiſtening them with a ſolution of liver of ſulphur.

Diſſolve white or green vitriol in water, and writing with the ſolution, nothing will appear. Boil galls in water, and dip a linen rag in the decoction, and with it rub the place before writ, and it will appear black and legible. Rub it over again with ſpirit of vitriol, or its oil, and the writing will diſappear again; rub it over again with oil of tartar per deliquium, the letters will appear again, but of a yellow colour. If the blackneſs of ordinary ink be deſtroyed by a ſufficient quantity of nitrous acid, the writing made by it will remain inviſible till it be moiſtened with liquid fixed alkali.

The golden ſympathetic ink.—This is made by diſſolving in aqua regia as much gold as that menſtruum can take up, and then adding to the liquor five or ſix times as much water; in another veſſel there muſt be ſome tin diſſolved in aqua regia; and when that menſtruum has alſo taken up as much of the metal as it can, there is to be added to it an equal quantity of common water. The letters muſt be written on white paper with the ſolution of gold, and the writing being dried in the ſhade, the letters will not appear, at leaſt not for ſeven or eight hours afterwards; dip a pencil in the ſolution of tin, and rub that over the ſolution of gold with which the letters were written, and they will appear of a beautiful purple. It might be ſuppoſed, that any other metals which were ſoluble in the ſame acid menſtruum would equally produce this effect; but experiment ſhews, that this is not the caſe; and ſilver and copper, though both ſoluble in aquafortis, yet produce no change of colour by theſe precipitations made by mixing the ſolutions of them on paper; and this example of ſuch an effect in the ſolutions of gold and tin, is an exception to the general rules in the ſolutions of metals, and their effects on one another.

The purple colour of theſe letters may be again effaced by rubbing ſome ſimple aqua regia over the paper, and may be made to appear again by rubbing over that the ſolution of tin. Kunkel, Caſſius and Orſchal, with ſome other writers, made the firſt ſteps towards this diſcovery, by their attempt to give cryſtal, by means of gold, the colour of the oriental rubies. There are, beſide theſe mineral preparations, ſome vegetable ones, which give the ſame phenomena, but theſe are the more certain.

Of the ſecond kind of ſympathetic inks, or thoſe which appear on being expoſed only to the air, is the golden ink made by adding to a ſolution of gold in aqua regia, ſo much water that the liquor ſhall not ſtain a white paper: letters written with this will not appear till the paper has been expoſed ſome hours to the open air, and they will then begin to acquire a colour by degrees, till they at length become of a deep violet colour, tending to black. If, inſtead of expoſing the paper to the air, it be kept in a box cloſe ſhut up, or cloſely folded in other paper, it will remain inviſible two or three months; but at the end of that time it will begin to appear, and will by degrees become of a deep violet colour. So long as the gold remains united to its diſſolvent, it is yellow; but the acid that diſſolves it being of a volatile nature, the greater part of it evaporates, and leaves no more than is juſt neceſſary to colour the calx of gold which remains upon the paper.

The ſecond of theſe is the ſilver ink, made by a ſolution of ſilver in aquafortis, weakened by diſtilled water, till it will not ſtain the paper. Letters written with this will be inviſible for three or four months, if ſhut up in a box; but if they be expoſed to the ſun they become legible in about an hour, becauſe by this means the evaporation of the acid is accelerated. The letters written with this ink are of a ſlate colour; and that from the ſulphureous nature of the aquafortis, every thing that is ſulphureous blackening ſilver. This blackiſh colour, however, is not permanent; for the ſulphureous part finally evaporating, the letters are left to their natural appearance, and are of a fine true ſilver colour, if the ſilver that was uſed was fine, and the place open.

In this claſs there may alſo be placed ſeveral metallic diſſolutions; as that of lead in vinegar, and of copper in aquafortis, which give at length a browniſh colour upon the paper; as alſo the ſolution of tin in aqua regia, of mercury in aquafortis, of iron in vinegar, of emery and ſeveral of the pyritæ in ſpirit of ſalt. But all theſe, though they give letters which are after ſome time legible, on being expoſed to the air, are alſo made to appear inſtantly on the paper, holding them to the fire. Each of theſe ſolutions gives its own particular colour; but they have all this diſadvantage, that in time they eat away the paper, and the letters are ſeen in the ſhape of ſo many holes.

Of the third claſs of ink, or that which appears on rubbing over the paper with a brown or black powder, are almoſt all the glutinous expreſſed juices of plants, which are themſelves of no remarkable colour, the milk of animals, or any other thick and viſcous fluids. To uſe theſe, the letters muſt be written on a white paper, and when dry, there is to be thrown over them the fine powder of any coloured earth, or other ſuch ſubſtance; and the writing will afterwards appear coloured, becauſe its viſcous quality remains ſufficiently in it for the entangling and retaining this fine powder, though it falls eaſily off from every other part of the paper. Mem. Acad. Science, Par. 1737.

Among the methods which Ovid teaches young women to deceive their guardians, when they write to their lovers, he mentions that of writing with new milk, and of making the writing legible by coal-duſt, or ſoot.

> “ Tuta quoque eſt, fallitque oculos, e lacte recenti
> Litera: carbonis pulvere tange: leges.”
> De Arte Amandi, l. iii. v. 629.

Auſonius propoſes the ſame means to Paulinus, and he afterwards teaches other methods of ſecret writing. Auſon. Epiſt. xxiii. v. 21, &c. Eneas, in Poliorceticis, cap. 31, and Gellius, lib. xvii. cap. 9, mention the like. Pliny, lib. xxvi. cap. 8. mentions the milky ſap of certain plants for a ſimilar purpoſe.

Of the fourth claſs, or thoſe inks which become viſible on holding them to the fire, there are a vaſt number; and indeed all infuſions, the matter of which is readily burnt to a ſort of charcoal by a little fire, will anſwer this purpoſe. The niceſt of this kind is the ſal ammoniac ink, made by diſſolving a ſcruple of ſal ammoniac in two ounces of fair water. Letters written with this ſolution are inviſible on the paper, till it is held before the fire, or has an iron a little heated paſſed over it. The rationale of this is, that the inflammable part of the ſal ammoniac is burnt to charcoal by a heat which is not ſufficient to ſcorch the paper; and this is the caſe with all the reſt of this claſs. The letters written with this ſolution are, however, of no great duration; for the ſalt being apt to moiſten in the air, the letters ſoon ſpread, and run together in a confuſed manner.

Dr. Lewis ſays, that all the ſalts which he has tried produce this effect in a greater or leſs degree; nitre, alum, tartar, very weakly; ſea-ſalt more ſtrongly; fixed alkaline ſalts ſtill more ſo; but ſal ammoniac the ſtrongeſt of all. Metallic ſolutions, made in acids, and diluted ſo as not to corrode the paper, act in the ſame manner. The juice of lemons and milk have alſo been uſed as ſympathetic inks, the writing with which appears upon the application of heat ſufficient to decompoſe the oily and mucilaginous parts of theſe liquors.

The fifth claſs of ſympathetic ink contains only one yet known kind.

This, though in itſelf inviſible, becomes of a blueiſh green when held to the fire; and this colour diſappears again as the paper cools, and is to be produced again on holding it again to the fire: and this for a long time, and a repeated ſeries of trials. It may alſo, according to the different manner of treating it, be made to appear blue, green, yellow, red, and ſome other colours. This property of the tinging matter of biſmuth ore was publiſhed at full length by a German lady, in 1705.

A certain German chemiſt ſhewed the academy at Paris a ſalt of roſe-water, which became blue on holding it to the fire, and at the ſame time ſhewed the ore from which he procured the ſalt, which he called an ore of marcaſite, a name given by many to the biſmuth ore. He added, that this was the mineral from which the fine blue ſmalt of Sneeberg was prepared, and that no other ore but this afforded it, and that he made the tincture from this mineral with aquafortis, which he fixed with ſea-ſalt.

This was the ſubſtance of what the German declared, and from what Mr. Hellot, in 1736, took the hint for his diſcovery of this remarkable ink. The ſalt was, after many experiments, at length found to be produced from an arſenic ore; and it was found, that all the cobalts and ores of biſmuth afford a tincture capable of theſe changes by fire.

The method of preparing it is this: pour upon two ounces of arſenic ore, groſsly powdered, a mixture of five ounces of aquafortis, and five ounces of common water. After the firſt ebullition is over, place the veſſel in a gentle ſand-heat, and let it ſtand there till no more air-bubbles ſeem to aſcend; after this increaſe the fire, ſo as to make the liquor boil for about a quarter of an hour; after this the liquor will become of a reddiſh colour, and when cold it is to be decanted clear off from this ſediment into a phial; and after ſtanding in that ſome time, it is to be again decanted off from what is precipitated there; and ſo on for three or four times till it is quite clear; for it muſt not be filtered, leſt the acid ſhould take ſomething from the paper that might ſpoil the effects. When the liquor is clear, there muſt be added to it two ounces of white ſea-ſalt: this mixture is to be evaporated over a gentle ſand-heat, till there remains only a dry ſaline maſs. When the liquor is grown hot, it changes from its orange colour to a fair red; and when the aqueous humidity is evaporated, it becomes of a beautiful emerald colour, and from this, as it dries up, it changes by degrees to a dirty green, like that of verdigris in the cake. As it becomes nearly dry, it muſt be ſtirred about with a glaſs rod or peſtle, to keep it from uniting into a maſs; and it muſt not be kept over the fire till perfectly dry, becauſe by that means the colour is often loſt, and the ſalt from green becomes of a duſky yellow; but if it be taken from the fire while it is green, it gradually becomes reddiſh as it cools, and finally is of a roſe-colour. The manner of uſing this ſympathetic ink is this: write with it on a fine and ſmooth paper, or draw with a black-lead pencil the figure of a plant or tree on the paper; then trace over the ſame lines with this liquor; let it dry in the open air, and then rub off the black lines with bread, and the paper will appear altogether fair, though the lines made by the ink are in reality ſunk deep into it. On holding this paper to the fire the lines will all appear, and the figure of the plant or the letters will be painted in a beautiful blueiſh green, which will continue ſo long as the paper is warm; but when it is cold again, they will wholly diſappear. The lines, therefore, diſappear much ſooner in winter than in ſummer; and in very hot weather it is often neceſſary to lay the paper on a marble, or other very cold body, in order to produce this effect. At any time, if the paper be ſcorched in the experiment, the colour of the lines will not diſappear again, even if ice be laid upon them. If the writing be expoſed for three or four days to a humid air, the lines will appear of a fine pale red. If the impregnation of the ore of biſmuth, inſtead of ſea-ſalt, have alum added to it, and the whole proceſs be continued as before deſcribed; and if letters be written with the red liquor as it is taken out of the veſſel, the letters will not appear even on holding it to the fire; but if the paper be wetted over with a clear ſolution of marine ſalt, and then left to dry, and afterwards held to the fire, the letters will appear blue. The ſame alſo will be the effect, if the writing be expoſed to the vapour of hot ſpirit of ſalt. When this preparation is thus made with alum, inſtead of common ſalt, the liquor never becomes green, but continues red, and never changes colour in the drying, or afterwards. The green colour ſeems to be wholly the effect of the ſea-ſalt; for not only this aluminate impregnation, but others in which other ſalts had been employed, were always found to be of a different colour.

Glauber's ſalt, uſed inſtead of common ſea-ſalt, left the maſs red in the ſame manner as alum did. Nitre added, inſtead of ſea-ſalt, gave the precipitate or dried ſalt a beautiful purple colour, which became white on the inſtant that water was poured upon it, and a roſe-coloured tincture was drawn from it, which gave lines or letters on paper, which continued inviſible as long as they were cold, but aſſumed a beautiful red on holding the paper to the fire; which colour they retained no longer than while the paper continued warm, diſappearing afterwards in the ſame manner with the green colours made by the ſea-ſalt; and if a ſimple ſolution of ſea-ſalt be rubbed over the paper, and ſuffered to dry, and the paper be afterwards heated, the lines appear blue. Borax has the ſame effect in this preparation with the nitre. All theſe experiments were made with the neutral ſalts; but in order to try what would be the effects of alkalies in the mixture, Mr. Hellot added to three ounces of the impregnation of the ore in aquafortis, pure ſalt of tartar, till the ebullition ceaſed; but the conſequence of this was no great precipitation, but merely the ſubſiding of a ſmall white ſediment; this mixture being evaporated nearly to a dryneſs, the remaining maſs, ſo long as it was warm, appeared of a beautiful purple; but this became paler as it dried, and turned white in an inſtant on pouring

ing water upon it. This diſſolved in water, in the manner of the others, gave lines on paper of a faint roſe-colour, which appeared or diſappeared in the manner of thoſe made by the other ſolutions, according as the paper was hot or cold; and the wetting of the paper with a ſolution of ſea-ſalt, had the ſame effects on this as on the others, making the lines appear blue on holding to the fire. Mem. Acad. Par. 1737. See *Colours from* Metals.

The ink may be eaſily made by digeſting zaffre, commonly ſold by druggiſts, in aqua regia; and thus is obtained the ſoluble part of zaffre, which is the calx of cobalt. This ſolution is then to be diluted with a little common water. In expoſing the paper written with this ſolution to the fire, care muſt be taken not to heat it too much; for in this caſe, the writing will not again diſappear by expoſure to cold. This ink, ſays Macquer, the author of the Chemical Dictionary, may be applied to the drawing of landſcapes, in which the earth and trees deſtitute of verdure, being drawn with common ink, give a proſpect of winter; and which may be made to aſſume the appearance of ſpring, by expoſure to a gentle heat, which covers the trees with leaves and the earth with graſs, by rendering viſible thoſe parts of the landſcapes which are drawn with this ſympathetic ink; and, as the ſolution of regulus of cobalt or zaffre in ſpirit of nitre acquires a reddiſh colour by the application of heat, the red ſolution might be contrived to repreſent the fruits and flowers.

Ink-*fiſh*, in *Ichthyology*. See Cuttle-*fiſh*, and Sepia.

INLAGATION, Inlagatio, a reſtoring of one outlawed to the protection of the law and benefit of a ſubject.

The word comes from the Saxon *inlagium, i. e. inlagare.* Terms of Law.

INLAGH, Inlagatus, he that is of ſome frank-pledge, and not out-lawed. It ſeems to be the contrary to *utlagh*.

INLAND implies any thing ſituate in the main land, or heart of a country, far from the ſea-coaſts.

Hence inland bills, in traffic, are ſuch bills as are payable in the ſame land, wherein they are drawn. See Bill.

Inland *Navigation,* is applied to the paſſage of boats, barges, and veſſels on canals and navigable rivers, within a country, to diſtinguiſh it from navigation, properly ſo called, by means of ſhips on the open ſeas or the largeſt of the lakes. No country in the world can vie with the Britiſh iſlands at the preſent day, for the extent and importance of their artificial inland navigation or Canals, under which article we have given a connected view of theſe, and of the navigable rivers and railways, forming altogether a ſyſtem of improved communication no where to be equalled; and yet nearly the whole of them originated and was completed by individuals without the aſſiſtance of the ſtate. See alſo the names of the ſeveral canals, rivers, &c. for further information.

INLAYING. See Veneering, Mosaic, and Marquetry.

INLEASED, in our *Old Writers*, ſignifies entangled or enſnared. It is uſed in the champion's oath. 2 Inſt. 247. Blount.

INLETS, *Bay of*, in *Geography*, a bay on the coaſt of New Holland, ſo called by Cook, in June 1770, lying between cape Palmerſton and cape Townſhend.

INLI, a town of Corea; 45 miles W. of Hoang-tcheou.

INLISTING, in a *Military Senſe*. See Listing.

INMATES, ſuch perſons as are admitted, for their money, to live in the ſame houſe or cottage with another man, in different rooms, but going in at the ſame door; being uſually ſuppoſed to be poor, and not able to maintain a whole houſe themſelves. Theſe are inquirable in a court-leet.

No owner or occupier of a cottage ſhall ſuffer any inmates therein, or more families than one to inhabit there, on pain of forfeiting 10*s*. per month to the lord of the leet.

INN, in *Geography*, a river which riſes in the country of the Griſons, about 12 miles S.W. of Zuls, and runs into the Danube near Paſſau.—Alſo, a river of Auſtria, which runs into the Danube near Efferding.

Inn, a place appointed for the entertainment and relief of travellers.

Inns are licenſed and regulated by juſtices of the peace, who oblige the landlord to enter into recognizances for keeping good order. See Alehouses.

If a perſon who keeps a common inn refuſes to receive a traveller into his houſe as a gueſt, or to find him victuals and lodging, on his tendering him a reaſonable price for them, he is liable to an action of damages, and may be indicted and fined at the king's ſuit. (1 Ventr. 333.) By the yearly acts againſt mutiny and deſertion, the conſtable, and in his default a juſtice of the peace, may quarter ſoldiers in inns, livery-ſtables, ale-houſes, and victualling-houſes. The rates of all commodities ſold by innkeepers, according to our ancient laws, may be aſſeſſed; and innkeepers not ſelling their hay, oats, beans, &c. and all manner of victuals, at reaſonable prices, without taking any thing for litter, may be fined and impriſoned, &c. by 21 Jac. I. c. 21. Where an innkeeper harbours thieves, perſons of infamous character, or ſuffers any diſorders in his houſe, or ſets up a new inn where there is no need of one, to the hindrance of ancient well governed inns, he is indictable and fineable; and by ſtatutes ſuch inn may be ſuppreſſed. (1 Hawk. P. C. 225.) Action upon the caſe lies againſt any innkeeper, if a theft be committed upon his gueſt by a ſervant of the inn, or any other perſon not belonging to the gueſt; though it is otherwiſe where the gueſt is not a traveller, but one of the ſame town or village; for in that caſe the innkeeper is not chargeable; nor is the maſter of a private tavern anſwerable for a robbery committed on his gueſt. It is ſaid that even though the travelling gueſt does not deliver his goods, &c. into the innkeeper's poſſeſſion, yet if they are ſtolen he is chargeable. An innkeeper is not chargeable for any thing out of his inn, but only for what is within it; yet where he of his own accord puts the gueſt's horſe to graſs, and the horſe is ſtolen, he is anſwerable; he not having the gueſt's orders for putting ſuch horſe to graſs. The innkeeper may juſtify ſtopping the horſe, or other things of his gueſt, for his reckoning; and may detain the ſame until it be paid. Where a perſon brings his horſe to an inn and leaves him in the ſtable, the innkeeper may detain him until ſuch time as the owner pay for his keeping; and if the horſe eats out as much as he is worth, after a reaſonable appraiſement made, he may ſell the horſe and pay himſelf. But when a gueſt brings ſeveral horſes to an inn, and afterwards takes them all away, excepting one, this horſe ſo left may not be ſold for payment of the debt of others; for every horſe is to be ſold, only to make ſatisfaction for what is due for his own meat.

Any perſon found tippling in an inn, is adjudged within the ſtatutes againſt drunkenneſs; and innkeepers, or alehouſe-keepers, permitting tippling in their houſes, are liable to the penalty of 10*s.* &c. by 1 Jac. cap. 9. 1 Car. cap. 4. 21 Jac. cap. 7.

Inns. Our colleges of municipal or common law profeſſors and ſtudents, are called inns: the old Engliſh word for houſes of noblemen, biſhops, and others of extraordinary note, being of the ſame ſignification with the French word *hotel.*

Inns *of Court* are ſo called, as ſome think, becauſe the ſtudents there are to ſerve and attend the courts of judicature; or elſe, becauſe anciently theſe colleges received none but the ſons of noblemen, and better ſort of gentlemen, who were there to be qualified to ſerve the king in his court; as Forteſcue affirms. And in his time he ſays, there were about two thouſand ſtudents in the inns of court and chancery, all of whom were *filii nobilium*, or gentlemen born. But this cuſtom has gradually fallen into diſuſe; ſo that in the reign of queen Elizabeth, ſir Edward Coke does not reckon above a thouſand ſtudents, and the number at preſent is very conſiderably leſs; for which judge Blackſtone aſſigns the following reaſons: 1. Becauſe the inns of chancery being now almoſt totally filled by the inferior branches of the profeſſion, are neither commodious nor proper for the reſort of gentlemen of any rank or figure; ſo that there are very rarely any young ſtudents entered at the inns of chancery. 2. Becauſe in the inns of court all ſorts of regimen and academical ſuperintendence, either with regard to morals or ſtudies, are found impracticable, and therefore entirely neglected. Laſtly, becauſe perſons of birth and fortune, after having finiſhed their uſual courſes at the univerſities, have ſeldom leiſure or reſolution ſufficient to enter upon a new ſcheme of ſtudy at a new place of inſtruction; wherefore few gentlemen now reſort to the inns of court, but ſuch for whom the knowledge of practice is abſolutely neceſſary in ſuch as are intended for the profeſſion. Comm. book i. p. 25.

Our inns of court, juſtly famed for the production of men of learning in the law, are governed by maſters, principals, benchers, ſtewards, and other officers; and have public halls for exerciſes, readings, &c. which the ſtudents are obliged to attend, and perform for a certain number of years, before they can be admitted to plead at the bar. Theſe ſocieties have not, however, any judicial authority over their members; but inſtead of this they have certain orders among themſelves, which have by conſent the force of laws. For lighter offences perſons are only excommoned, or put out of commons; for greater, they loſe their chambers, and are expelled the college; and when once expelled out of one ſociety, they are never received by any of the others. The gentlemen in theſe ſocieties may be divided into benchers, outer-barriſters, inner-barriſters, and ſtudents.

The four principal inns of court, are the Inner Temple, and Middle Temple, heretofore the dwelling of the Knights Templars, purchaſed by ſome profeſſors of the common law about three hundred years ago; Lincoln's Inn and Gray's Inn, anciently belonging to the earls of Lincoln and Gray. The other inns are the two Serjeants Inns

Inns *of Chancery* were probably ſo called, becauſe anciently inhabited by ſuch clerks as chiefly ſtudied the forming of writs which regularly belonged to the curſitors, who are officers of chancery.

The firſt of theſe is Thavies Inn, begun in the reign of Edward III. and ſince purchaſed by the ſociety of Lincoln's Inn. Beſides this we have New Inn, Symond's Inn, Clement's Inn; Clifford's Inn, anciently the houſe of lord Clifford; Staple's Inn, belonging to the merchants of the ſtaple; Lion's Inn, anciently a common inn with the ſign of the lion; Furnival's Inn, and Bernard's Inn.

Theſe were heretofore preparatory colleges for younger ſtudents; and many were entered here before they were admitted into the inns of court. Now they are moſtly taken up by attornies, ſolicitors, &c.

They all belong to ſome of the inns of court, who formerly uſed to ſend yearly ſome of their barriſters to read to them.

Inn, or *Inner*, in the *Manege*, is applied differently, according as the horſe works to the right or left upon the volts, or as he works along by a wall, a hedge, or the like. For along or by a wall, the leg that is of a ſide with, or next the wall, is the outer, and the other the *in* or *inner* leg. And if upon volts, the horſe works to the right, the right heel is the inner, and the left the outer heel, and ſo of the other parts of the body, furniture, &c. The direct contrary of this will happen, if the horſe works to the left.

INNATE Air. See Air.

Innate *Force.* See Vis *Inſita.*

Innate *Heat.* See Heat.

Innate *Ideas*, or *Principles*, are certain primary notes or characters, by many ſuppoſed to be ſtamped on the mind of man when it firſt receives its being, and which it brings into the world with it.

But the doctrine of innate ideas is abundantly confuted by Mr. Locke. See Idea.

Innate, in *Natural Hiſtory*, particularly in that branch of it which treats of foſſil remains or reliquia, is applied to ſuch parts of the animal bodies as have been produced independently of any effort of the animal, and are either internal parts, as the bones, which often give the form to extraneous foſſils, or external parts, as the ſcales and fins of fiſh, the horny covering in ſome of the amphibia, and the integument which incloſes the whole of the body in inſects, all of which are ſometimes found in a foſſil ſtate, as Mr. William Martin obſerves in his "Outlines," p. 86. The genera of reliquia which do not depend on innate parts, but on fabricated parts of the animal parts, which are ſuperadded to the body by ſome voluntary effort of the animal, are called conchyliolithus and eriſmatolithus.

INNER Barrister. See Barrister.

Inner *Poſt*, is an additional piece of oak timber brought on to the foreſide of the main poſt upon which the tranſoms are let on or ſeated; it adds to the ſecurity of the planks, as the main poſt is ſeldom ſufficient before the rabbit for that purpoſe, and greatly ſtrengthens the ſtern or main poſt.

Inner *See*, in *Geography*, a river which riſes about five miles N.W. of Goſlar, and runs into the Leine, in the biſhopric of Hildeſheim.

Inner *Sound*, a ſtrait of the North ſea, between the iſle of Skye, and the N.W. coaſt of Inverneſsſhire, in Scotland.

INNERSHON, a ſmall iſland on the weſt ſide of the gulf of Bothnia. N. lat. 61° 34′. E. long. 17° 6′.

INNICHEN, a town of Germany, in the Tyroleſe ſituated near the Drave; anciently called "Aguntum;" 29 miles E. of Brixen. N. lat. 46° 41′. E. long. 12° 20′.

INNINGS, lands recovered from the ſea, by draining and banking.

INNITPOUR, in *Geography*, a town of Bengal; 48 miles N. of Dacca.

INNO, *Ital.* a hymn, or ſpiritual ſong.

INNOCENT I. pope, in *Biography*, was a native of Albano, and was unanimouſly elected to the popedom by the clergy and people, on the death of Anaſtaſius in the year 402. He obtained from the emperor new and ſevere laws againſt the Donatiſts, in conſequence of which that ſect was cruelly perſecuted, and thoſe who refuſed to return to the boſom of the Catholic church were puniſhed with fines, baniſhment, the confiſcation of goods, and in ſome inſtances with death. He eſpouſed the cauſe of Chryſoſtom, and even refuſed to hold communion with the eaſtern churches, on account of their treatment of that eminent man. He was the firſt who perſecuted the Novatians at Rome, by depriving them of their churches, and preventing their aſſembling in public, for religious worſhip; the Pelagians came likewiſe under his laſh; he declared them not only unworthy of Chriſtian communion, but of human ſociety, and even of life. He died in the year 417, after having preſided over the church about fifteen years. He was a perſon of great addreſs, and a lively genius, and was well acquainted with the traditions of the church. His decretals ſufficiently ſhew his uſurping and domineering ſpirit, and his wiſhes to make the Chriſtian world ſubmit to his inſolence; they have been frequently quoted by the advocates of the ſee of Rome, to demonſtrate how early the popes claimed, as the ſucceſſors of St. Peter, an univerſal authority and juriſdiction. Thirty-four letters, in the firſt volume of the "Letters of the Popes" have been attributed to this pontiff, but by many of the ableſt critics the greater part of them has been regarded as ſuppoſititious.

Innocent II. pope, a deſcendant from a noble family at Rome, aſcended the papal throne in the year 1130. He had already filled ſome reſpectable offices in the church, and is ſaid to have led a moſt exemplary life from his infancy, and to have been diſtinguiſhed for eminent abilities and ſtrict probity, while he was at the ſame time of a moſt humane and courteous diſpoſition. He was promoted to the ſacred college by the title of cardinal St. Angelo, and was employed by ſeveral of the popes in important negociations at home and abroad. Upon the death of Honorius II. he was elected his ſucceſſor by a part only of the conclave, the reſt chooſing Peter de Leon, the ſon of a Jew, who took the name of Anacletus II., and was acknowledged by the kings of Scotland and Sicily, while Innocent was received by the other princes of Europe. Being driven from Italy, he fled to France, where he held ſeveral councils, at one of which he thundered out a ſentence of excommunication againſt Anacletus, and all his adherents. He crowned the emperor Lotharius with great ſolemnity, and for the ſupport of his new dignity granted to him, to his daughter, and to his ſon-in-law, during their lives, all the eſtates of the counteſs Matilda. On the death of his rival, another pope was choſen by the ſame party, who took the name of Victor, but who, probably, feeling himſelf unequal to contend with the power of Innocent, threw himſelf at the feet of the pontiff, and thus put an end to the ſchiſm in the church. Innocent, having now no enemy to diſturb his peace, took up his reſidence at Rome, and ſummoned a general council to meet in the Lateran in the year 1139. This was the moſt numerous council that had ever been held, conſiſting, it is reported, of a thouſand biſhops, beſides a crowd of abbots and other eccleſiaſtics, who, beſides other buſineſs, declared the ordinations of Anacletus null; excommunicated Roger, king of Sicily, and condemned the opinions of the famous Arnold of Breſcia. Innocent, after this, was not contented with the pacific duties of his office, but actually marched in perſon, with his army, againſt the prince who ſeemed to ſet at his defiance the ſentence of excommunication. Roger was too well ſkilled in military tactics to leave the event of the conteſt doubtful, he attacked the epiſcopal army, which he put to flight, and was ſo completely ſucceſsful, as to take the holy pontiff priſoner, with ſeveral cardinals, and other perſons of diſtinction. When Innocent was conducted into the king's camp, he found, what he little expected, that he had fallen into the hands of a generous enemy; the victorious king ſent ſome of his principal officers to beg his holineſs's pardon, and to aſſure him he was ready to enter into an accommodation upon the terms which he had formerly offered by his deputies. Innocent readily acceded: the terms were drawn up and executed, in conſequence of which the pope abſolved Roger from excommunication, and ſolemnly inveſted him with the kingdom of Sicily, the dukedom of Apulia, and the principality of Capua; while, on the other hand, the king acknowledged Innocent for lawful pope, and engaged to aſſiſt him whenever his aid ſhould be required. Upon the recovery of his liberty Innocent returned to Rome, but the remainder of his life was ſpent in much diſquiet. The laſt two years of his life were wholly occupied in reducing ſeveral cities which attempted to ſhake off the yoke of the apoſtolic ſee, and to recover their ancient liberty. The Romans alſo refuſed to obey him as their prince, reſtored their ſenate, and created their own magiſtrates. In the midſt of theſe calamities the pope fell ſick, and died in 1143, after a pontificate of nearly fourteen years. In private life he was moſt highly eſteemed on account of the ſuavity of his manners, but from the ſeveral revolts which took place while he was head of the church, it has been ſuſpected that his adminiſtration of government was not conducted with prudence and wiſdom, and that his zeal for exalting the papal pretenſions was not behind that of any of his predeceſſors. Forty-three of his letters are inſerted in the tenth volume of the Collect. Concil.

Innocent III. pope, originally called Lotharius, was a deſcendant from the illuſtrious houſe of the counts of Segni, and born at Anagni about the year 1161. After purſuing his ſtudies at Rome, he went to the univerſity of Paris, where he was admitted to the degree of doctor. From this period he was advanced very rapidly in the church; was ordained ſub-deacon by Gregory VIII., and preferred to the dignity of cardinal-deacon by Clement III., under the title of cardinal St. Sergius, and St. Bacchius. On the death of pope Celeſtine III. in the year 1198, Lotharius was elected his ſucceſſor, being then only in his thirty-ſeventh year. Being at this period only in deacon's orders, he was firſt ordained prieſt, in order to his being able to undertake the high office of pope, when he aſſumed the name of Innocent III. From the moment of his exaltation, he ſeems to have ſet before him, as objects for his imitation, the character and conduct of pope Gregory VII., and with equal intrepidity and addreſs, purſued his plans of ambition, till he arrived at a height of deſpotiſm, which the world beheld with wonder and aſtoniſhment, but to which the ſtates of Europe ſubmitted with a ſilence that was highly diſgraceful to them. "Under this young and ambitious prieſt," ſays Gibbon, "the ſucceſſors of St. Peter attained the full meridian of their greatneſs; and in a reign of eighteen years, he exerciſed a deſpotic command over the emperors and kings whom he raiſed and depoſed; over the nations, whom an interdict of months or years deprived, for the offence of their rulers, of the exerciſe of Chriſtian worſhip. In the council of the Lateran he acted as the eccleſiaſtical, almoſt as the temporal, ſovereign of the Eaſt and Weſt. It was at the feet of this legate that John of England ſurrendered his crown; and Innocent may boaſt of the two moſt ſignal triumphs over ſenſe and humanity, the eſtabliſhment of tranſubſtantiation, and the origin of the inquiſition. At his voice, two cruſades, the fourth and the fifth, were undertaken; but except a king of Hungary, the princes of the ſecond order were at the head of the pilgrims; the forces were inadequate to the deſign; nor did the effects correſpond with the hopes and wiſhes of the pope and the people." Innocent did not confine his efforts to the Holy Land, he promoted a cruſade againſt the Albigenſes. He firſt attempted to convert them by his miſſionaries, one of whom was murdered, which was the ſignal for the diſplay of all his wrath; he did not even deign to inſtitute an inquiry, but ordered the whole race to be purſued with fire and ſword, and to be treated with more ſeverity than the Saracens themſelves. Immenſe numbers of lives were ſacrificed in his holy war, and barbarities practiſed, before unheard of; but the perpetrators of them were applauded and rewarded by the cruel pontiff, and the infernal ſpirit by which they had been actuated was impiouſly called zeal in ſupporting the cauſe of God and of the church. In 1215, the fourth general Lateran council was held at Rome, which was ſo managed by the all-controlling power of the pontiff, that inſtead of exerciſing the functions of a deliberative body, it was made uſe of only as an inſtrument to regiſter canons and decrees which Innocent had drawn up, and which he permitted to be read for their approbation. In this council a ſentence, which had been pronounced ſome time before, ſuſpending Stephen Langton, archbiſhop of Canterbury, was confirmed. The pope, likewiſe, thundered out a ſentence of excommunication againſt the barons, which they treated with merited contempt, and bravely perſiſted in defending thoſe privileges, the charters of which they had lately compelled their monarch to ſign. In the year 1216, Innocent undertook a journey to Piſa; but on his arrival at Perugia he was attacked with a violent diſorder, which put an end to his life in a few days. According to Mr. Berington, "Innocent was learned, magnificent, perſeverant, wiſe. In the knowledge of laws and politics he had no equal: he poſſeſſed the art of government, and was obeyed more from fear than love. Ambition was his ruling paſſion, to gratify which, he overſtepped the bounds of decency and juſtice, playing as wantonly with the ſolemn cenſures of the church as if they had been inſtituted for the common purpoſes of wayward caprice or reſentful vengeance. To look into him for the amiable virtues of life, or for thoſe which ſhould form the paſtoral character, would be loſs of time. The prerogative of the holy ſee, built up by adulation and miſjudging zeal, filled his mind; its aggrandizement he ſought ſometimes, perhaps, from motives which the cool reaſoner may excuſe; and the meteor of univerſal empire gleaming on his ſenſes, did not permit the operation of a diſpaſſionate and unbiaſſed judgment. No tears were ſhed when Innocent fell, but thoſe which Religion wept, too juſtly pained by the inordinate exertions and worldly views of her firſt miniſter." Innocent was the author of a variety of works, which are enumerated by Dupin, but the moſt valuable are his "Epiſtles," which threw conſiderable light on the eccleſiaſtical hiſtory of his time. His works have been collected in two volumes folio; the beſt edition is that publiſhed at Paris in 1682.

INNOCENT IV., pope, was a native of Genoa, and being diſtinguiſhed for his learning and attainments, he was in early life made canon of Parma, from which he was promoted to the chancellorſhip of the Roman church. In 1227 he was raiſed to the purple by Gregory IX., and in 1243 he was elevated to the papal throne, when he took the name of Innocent IV. Previouſly to this he was on terms of ſtrict intimacy with the emperor Frederic II., who had been engaged in a conteſt with the court of Rome, and that prince no ſooner received the news of his exaltation, than he ſent a ſplendid embaſſy to congratulate him upon his election, and to aſſure him that nothing ſhould be wanting to re-eſtabliſh harmony between the church and the empire. The pope, however, began to aſſume a dignity inconſiſtent with friendſhip, and he plainly declared that he was reſolved to maintain the higheſt pretenſions of the apoſtolical ſee. Legates were diſpatched to accommodate all differences, but it was of no avail, and hopes of reconciliation being at an end, Frederic prepared to reduce the pope to reaſon by the terror of his arms. Innocent, unable to reſiſt the power of the emperor, fled for protection to his native city, where he was received with every mark of diſtinction. Here he aſſembled a council, conſiſting of about 140 prelates, ſome princes, and the ambaſſadors of moſt of the crowned heads in Europe; he laid before this auguſt aſſembly the motives which induced him to call them together, deſcribing the emperor as a tyrant, a perſecutor of the church, and as guilty of hereſy, ſacrilege, and other grievous crimes. The council gave credit to the pontiff, and ſanctioned the ſentence of excommunication pronounced againſt him. This led to a moſt deſtructive war, which was carried on in Germany and Italy till the death of the emperor Frederic in 1250, who was ſucceeded by his eldeſt ſon Conrad, who took up his father's cauſe with ſo much zeal and intrepidity, as rendered Innocent fully ſenſible of his inability to withſtand that prince with his own forces only. He accordingly made many unſucceſsful attempts for obtaining aſſiſtance, and his army was defeated, which ſo affected the pontiff, that he fell ſick and died in the month of December 1254, after he had preſided over the church nearly twelve years. He had high notions reſpecting the power and authority of the papal ſee: he poſſeſſed conſiderable learning; was well acquainted with the divinity of the times, and was regarded as the beſt civilian of his age. He was author of a work entitled "Apparatus, Libris quinque diſtinctus, in totidem Libros Decretalium," firſt printed at Venice in 1570; and of ſeveral other pieces, beſides twenty letters, which are inſerted in the eleventh volume of the Collect. Concil. He was not only learned, but a great encourager of learning, and is ſaid to have been the firſt who gave red hats to the cardinals.

INNOCENT V., pope, was born at a town on the Iſere, in Burgundy. When very young he entered the Dominican order of preaching friars, and purſued his ſtudies in divinity with ſo much ſucceſs, that he was appointed to fill the theological chair in the univerſity of that city, and was conſidered as one of the moſt learned divines of the age. He obtained conſiderable preferment in the church, and about 1271 was nominated by pope Gregory X. archbiſhop of Lyons, and ſoon afterwards was promoted to the ſacred college by the title of cardinal biſhop of Oſtia. On the death of Gregory he was unanimouſly choſen his ſucceſſor in the papal dignity, and took the name of Innocent V. Beſides reconciling thoſe ſtates of Italy which were carrying on the moſt bloody wars againſt each other under the oppoſite denominations of Guelphs and Gibellines, and bringing about a peace between the republics of Lucca and Piſa, he projected the miſſion of a ſplendid legation into the Eaſt, to obtain from the emperor, Michael Palæologus, the confirmation of the articles of union, but he died before he could carry his deſign into execution, after a ſhort pontificate of about five months. He wrote "Commentaries" upon the Pentateuch, the Canticles, and the Goſpels: "Notes on the Epiſtles of St. Paul," and other pieces, which have been publiſhed ſince his death.

INNOCENT VI., pope, formerly called Stephen Aubert, was brought up to the ſtudy and practice of the law, and in 1335 he was profeſſor of the civil-law at Toulouſe, and chief judge of that city. In two years after we find him biſhop of Noyon, and in 1340 he was tranſlated to the ſee of Clermont. In 1342 he was raiſed by pope Clement VI. to the dignity of cardinal biſhop of Oſtia, and at the ſame time appointed grand penitentiary of the Romiſh church. In 1352 he was unanimouſly choſen pope, and took the name of Innocent VI. He made it his buſineſs to correct abuſes, and alſo aboliſhed the heavy impoſitions laid upon the clergy, when preferred to any new benefice or dignity. He retrenched all the unneceſſary expences of the papal court, contenting himſelf even with a ſmall number of attendants: he obliged the cardinals to follow his example, urging them to beſtow the ſuperabundance of their wealth in relieving the neceſſities of the poor. Innocent maintained the decrees of his predeceſſors againſt thoſe Minorite friars who aſſumed the title of "Spiritual Brethren," and who contended againſt the right of the clergy poſſeſſing any property. Two of this deſcription were arreſted at Montpelier in the year 1354; the pope attempted to convert them from the error of their ways, but finding them obſtinate, he gave them up to the inquiſitors to be burnt alive. In the following year he ſent a legate a latere to Rome to crown Charles, king of Germany, and his queen Anne with the imperial crown, but not before that prince had ſubſcribed to the moſt humiliating conditions. After this, nothing occurs during the remainder of Innocent's pontificate which requires to be noticed. He died at Avignon in 1362, after he had filled the papal chair nearly ten years. He has been highly commended for his probity and the ſanctity of his life: he was generous to the wants of the poor: an enemy to vice, the patron and protector of virtue in every condition of life. He left behind him many epiſtles, ſome of which have been printed, and others are preſerved in the Vatican.

Innocent VII., pope, was born at Salmona, in Abruzzo, about the year 1339, obtained a high reputation for his knowledge of the civil and canon law, was made clerk of the apoſtolic chamber by pope Urban VI., and was afterwards employed to collect the revenues of the apoſtolic ſee of England. As a reward for his ſervices in thoſe ſituations he obtained conſiderable church preferment, and was at length raiſed to the ſacred college under the title of cardinal preſbyter of Santa Croce. On the death of Boniface IX. he was choſen to the popedom, and took the name of Innocent VII. Scarcely had he been conſecrated, when a dreadful tumult broke out in Rome between the Gibellines and the Guelphs: this led to other diſturbances, which laſted during the pontificate of Innocent, who died in about two years after his elevation. He is repreſented as of a mild and pacific diſpoſition; of a generous and beneficent temper; an enemy to all pomp and ſhow; free from pride and ambition, and of great addreſs in ſtate affairs. He is much blamed for having been the occaſion of elevating unworthy perſons to the higheſt poſts of dignity and truſt. He is author of a diſcourſe "On Church Union," and ſome "Letters."

Innocent VIII., pope, was born at Genoa in the year 1432: at an early age he was ſent to the court of Naples, where he lived ſeveral years during the reigns of Alphonſo and his ſon Ferdinand, and received ſubſtantial marks of favour from both princes. After this he removed to Rome, and obtained conſiderable church preferment, till at length he was raiſed to the purple by the title of cardinal of St. Balbina in the year 1473. Upon the death of Sixtus IV. in 1484, he was elected his ſucceſſor, and took the name of Innocent VIII., having been previouſly known by that of John Baptiſt Cibo. As ſoon as he was ſeated in his government, he attempted to procure another cruſade, but without ſucceſs. His efforts, however, contributed to bring much wealth into the apoſtolic treaſury, part of which the pope appropriated to his own uſe; and the reſt he expended on the repair of ancient works of art, or in ſupport of a war in which he ſoon became involved with Ferdinand, king of Naples. Innocent ſpent the concluding years of his pontificate in endeavouring to maintain order and good government in the church, and in cultivating the arts of peace. He cleared the country of robbers and aſſaſſins, with which it was at that time much infeſted; adopted meaſures for the regular ſupply of Rome with proviſions, and adorned it with many magnificent buildings. He died in the year 1492, aged 60, after he had filled the papal throne nearly eight years. He was poſſeſſed of a very moderate ſhare of learning and talents, but ſecured the attachment of all ranks by the ſweetneſs of his temper and the gentleneſs of his manner. His character, in a moral point of view, will not bear examination: he unbluſhingly acknowledged himſelf the father of a numerous progeny of natural children, and is ſaid to have been the firſt of the popes who introduced that new and extraordinary proceeding of owning publicly his ſpurious iſſue, heaping upon them riches without meaſure. He left behind him ſome letters, and one to Henry VII., king of England, againſt citing the clerical orders before ſecular tribunals.

Innocent IX., pope, known originally under the name of John-Anthony-Facchinetti, was born at Bologna in the year 1519, where he received his education, and was admitted to the degree of doctor in 1544. He now became a domeſtic in the family of cardinal Farneſe, who ſent him in the capacity of vicar to Avignon, and again to Parma. In 1566, he was ſent by Pius V. as nuncio to Venice, where he had a principal concern in eſtabliſhing the confederacy between the pope, the king of Spain, and the republic againſt the Turks. After this he was created patriarch of Jeruſalem, preſident of the inquiſition, and cardinal. In 1591, he was unanimouſly elected to the popedom, when he took the name of Innocent IX. He immediately projected grand plans of improvement, of an eccleſiaſtical and economical nature, none of which did he live to execute. He died in the ſecond month of his pontificate, at the age of ſeventy-two.

Innocent X., pope, was born at Rome about the year 1575, where he was educated and brought up to the profeſſion of the civil law, of which he was admitted doctor when he was only in his twentieth year. He obtained many inſtances of preferment in the church, and, in 1627, a cardinal's hat was preſented to him by pope Urban VIII. He was next made prefect of the eccleſiaſtical immunities, ſupreme judge of the inquiſition, and protector of the kingdom of Poland. On the death of Urban he was elected pope; he had already carried on an illicit commerce with his brother's widow, Donna Olympia Maldachini, to whom he now abandoned himſelf, the adminiſtration of his temporal affairs, and the government of the church. All benefices, all employments, whether eccleſiaſtical, civil, or military, were diſpoſed of by her to the higheſt bidders, without any regard to friendſhip or merit, or to the character of the purchaſers. She induced the pope to forget all ſenſe of right and wrong when it interfered with her wiſhes. In 1645, upon the application of the Dominicans, who were aſſociated with the Jeſuits in the miſſion to China, Innocent condemned the indulgence which the Jeſuits had ſhewn to the Chineſe ſuperſtitions. The moſt remarkable tranſaction of his pontificate, was his condemning, by a bull, in the year 1653, the five propoſitions ſelected by the Jeſuits from Janſenius's "Auguſtinus." He died in 1655, about the age of eighty-one, having filled the papal throne little more than ten years.

Innocent XI. was born at Como, in the duchy of Milan, in the year 1611. He was the ſon of a rich banker, and his firſt profeſſion was that of a ſoldier, in which he diſtinguiſhed himſelf by his gallantry. Quitting the military character he embraced the eccleſiaſtical profeſſion, and went to ſtudy at Naples, where he was admitted to the degree of doctor. Having filled, with high reputation, ſeveral offices in the church, he was raiſed to the purple in 1645, and, in 1678, he was elected to the popedom. He began his high career with aboliſhing abuſes, and ſuppreſſing many groſs ſuperſtitions then prevailing in the church of Rome. He likewiſe attempted, by wiſe inſtitutions and judicious regulations, to reform the manners of the clergy, and to ſtem the torrent of licentious morals among the laity. In 1677, he ſuppreſſed "the right of aſylum," enjoyed by foreign miniſters at Rome, extending much farther than their palaces, the immunities of which it was not deſigned to violate. Moſt of the ambaſſadors from foreign courts readily acquieſced, but the miniſter from the court of France refuſed to ſubmit to it, and the pope, unwilling to enter into a conteſt with Lewis XIV., allowed his ambaſſador to enjoy his ancient privileges. He had now a conteſt with the French king, about the right of diſpoſing of benefices and church lands claimed by that monarch, and confirmed to him by an aſſembly of the clergy, which nearly terminated in a ſeparation of the Gallican church from the Roman communion. It was on this occaſion that Lewis ſummoned the famous aſſembly of biſhops, which met at Paris in the year 1682, and drew up the four celebrated propoſitions declaring the power of the pope to be merely ſpiritual, and inferior to that of a general council, and maintaining the inviolability of the rules, inſtitutions, and obſervances of the Gallican church. Innocent died in 1689, having preſided over the Roman ſee twelve years and a half. He was virtuous and pious, but without pretenſions to learning. His zeal for the reformation of abuſes, the improvement of morals, and the reſtoration of church diſcipline, has given him a rank among the beſt of the popes.

Innocent XII., pope, originally named Anthony Pignatelli, was deſcended from an illuſtrious family at Naples, and born there in the year 1615, and ſucceeded to the popedom in 1691, as ſucceſſor to Alexander the VIIIth. In imitation of the example of pope Innocent XI. he applied himſelf to the reformation of the church and court of Rome. He was unwearied in his endeavours to reform the corrupt manners of the clergy, which were not wholly unſucceſsful, though he found that the entire accompliſhment of the Herculean taſk was a conſummation, which all his prudence and reſolution were unable to effect. He was anxiouſly devoted to the intereſts of the poor, and the wealth which many of his predeceſſors had been accuſtomed to accumulate, or to beſtow on worthleſs relatives, he devoted to the public benefit, employing it in the erection of hoſpitals, and other uſeful inſtitutions, and particularly in the improvement of the ports of Anzio and Nettuno. Innocent died in the year 1700, at the advanced age of eighty-five, after preſiding over the church about nine years. He had rendered himſelf univerſally reſpected by his talents, and beloved on account of his many virtues.

Innocent XIII., pope, formerly named Michael-Angelo Conti, ſon of Charles Conti, duke of Poli, was born at Rome in the year 1655. He roſe ſucceſſively to the higheſt offices in the church, till at length he was elected ſucceſſor to Clement XI., in the papal dignity, in the year 1721. He died in 1724, leaving behind him a character for great wiſdom, virtue, and learning. When a cardinal he diſtinguiſhed himſelf above moſt of the members of the ſacred college; but the infirmities to which he had been ſome years ſubject, prevented him from diſtinguiſhing his pontificate by any actions which are worthy of being recorded. As authorities for the foregoing articles, ſee Bower's Hiſt. of the Popes; Moreri, Gibbon, &c.

INNOCENTS Day, the name of a feaſt celebrated on the twenty-eighth day of December, in commemoration of the infants murdered by Herod.

Heretofore it was the cuſtom to have dances in the churches on this day, wherein were perſons, who repreſented biſhops, by way of deriſion, as ſome ſuggeſt, of the epiſcopal dignity; though others, with more probability, ſuppoſe it done in honour of the innocence of childhood. See Episcopus *puerorum*.

By a canon of the council of Cognac, held in 1260, theſe were expreſsly forbidden; but they were not wholly ſuppreſſed, at leaſt in France, before the year 1444, when the doctors of the Sorbonne addreſſed a ſpirited letter on this ſubject to all the biſhops of the kingdom.

INNOMINATA Arteria, in *Anatomy*, the firſt large trunk ſent off from the arch of the aorta. See Artery.

Innominata *glandula*, the lachrymal gland. See Eye.

INNOMINATI, *Gli Innominati*, *Anonymi*, perſons who have no names, a title by which the academiſts of Parma diſtinguiſh themſelves.

Moſt cities in Italy have an academy, and each has its proper name. Thus thoſe at Parma entitle themſelves Gli innominati, as if it was their character to have no name at all.

INNOMINATUM, Os, in *Anatomy*, the large bone compoſing the chief part of the ſides of the pelvis, and receiving the articulation of the lower extremity. See Extremities.

INNOVATION, in *Law*. See Novation.

INNUENDO, of *innuo*, *I nod*, or *beckon*, is a word frequently uſed in writs, declarations, and pleadings, to aſcertain a perſon or thing which was named, but left doubtful, before: as, he (*innuendo* the plaintiff) did ſo and ſo; mention being before made of another perſon. In common obſervation or writing, an *innuendo* denotes an oblique hint, or diſtant reference; in contradiſtinction to a direct and poſitive charge.

INNY, in *Geography*, the name of two rivers in Ireland; one which riſes in the county of Weſtmeath, and having paſſed through Loughs Derveragh and Iron, forms a boundary between this county and Longford, for ſeveral miles, after which it croſſes the ſouthern part of the latter, and flows into Lough Ree, an expanſe of the Shannon; the other is a mountain ſtream in the barony of Iveragh, Kerry, which empties itſelf into Ballin Skelig's bay.

INOCARPUS, in *Botany*, from ις, ινος, *a fibre*, or *nerve*, and καρπος, *a fruit*, becauſe the drupa of this genus is compoſed of fibres or nerves. Schreb. 297. Forſter. Gen. 35. Linn. Suppl. 35. Thunb. Nov. Gen. 45. Willd. Sp. Pl. v. 2. 624. Mart. Mill. Dict. v. 2. Juſſ. 152. Lamarck Dict. v. 3. 253. Illuſtr. t. 362. Claſs and order, *Decandria Monogynia*. Nat. Ord. *Dumoſæ*, Linn. *Sapotæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf (campanulate, according to Thunberg) in two, roundiſh, nearly equal ſegments. *Cor.* of one petal, tubular; tube cylindrical, longer than the calyx; limb longer than the tube, divided into five, linear, acute, undulated, often reflexed ſegments. *Stam.* Filaments ten, very ſhort, inſerted into the tube; the lower ones alternate; anthers ovate, twin, erect. *Piſt.* Germen oblong, hairy, ſuperior; ſtyle none; ſtigma a hollow point. *Peric.* Drupa ovate, incurved, compreſſed, large, ſingle-ſeeded. *Seed.* A nut compoſed of woody fibres; kernel oval, compreſſed.

Eſſ. Ch. Calyx bifid. Corolla funnel-ſhaped. Stamens in a double row. Drupa ſingle-ſeeded.

1. I. *edulis*. Willd. Sp. Pl. v. 2. 624. (Gujanus; Rumph. Amboin. v. 1. 170. t. 65.) A native of the Society, Friendly,

and New Hebrides Iſlands, in the South ſeas, and alſo of Amboina. Forſter deſcribes this as a lofty *tree*, having a *trunk* as thick as a man's body, with a brown chinky *bark*. *Branches* woody, ſpreading, variouſly divided. *Leaves* ovate-oblong, ſcarcely cordate, netted with abundance of veins. *Flowers* duſky white, ſcarcely half an inch in length. From Cook's laſt voyage we learn, that the nuts of *Inocarpus* are called *E—iſi*. The kernel of theſe, which is kidney-ſhaped, and about an inch in diameter, is eaten roaſted by the natives. It is ſweetiſh, but leſs pleaſant than the cheſnut, harder, and not ſo farinaceous. The bark is aſtringent, and uſed in the dyſentery. In New Guinea, they ſmear their arrows with the expreſſed reſinous juice.

INOCULATING, in *Gardening*, the art or practice of inſerting the buds of trees of the ſame kind into their ſtocks or other parts. It is a ſort of grafting which is often had recourſe to in the ſummer ſeaſon for raiſing different kinds of trees and plants, as it frequently ſucceeds better than that of the common method. It is uſually executed in the manner deſcribed below. A ſharp knife, with a flat haft for the purpoſe, and proper cuttings of the trees deſigned to be propagated being provided, a choice ſhould be made of a ſmooth part of the ſtock which is to be inoculated; five or ſix inches from the ground, where intended to be dwarf, but when for a ſtandard at the height of five and a half or ſix feet; and a horizontal cut made acroſs the rind of the ſtock, as well as a ſlit, about two inches in length, downwards from the middle of that cut, taking care not to go deeper than the thickneſs of the bark, leſt the ſtock be wounded; then having the cutting in readineſs, the leaf ſhould be cut off from the bud, leaving the foot-ſtalk remaining, but taking off the bud lengthways ſomewhat longer than the ſlit in the ſtock, with part of the wood adhering to it; which being done, ſlip the wood from the bark with the knife by means of a ſudden jerk, obſerving whether the eye of the bud be left or not, as ſuch buds as loſe their eyes in ſtripping are quite uſeleſs: as ſoon as this has been done, the bark ſhould be gently raiſed on each ſide of the ſlit in the ſtock with the handle of the knife, and the bud inſerted into it, being careful to place it ſmooth between the rind and the woody part of the ſtock, cutting off that part of the rind of the bud which may happen to be too long for the ſlit: having thus exactly fitted the bud to the ſtock, they ſhould be tied cloſely round with wetted ſtrong baſs, taking care not to paſs any ligature round the eye of the bud, which muſt always be left open and at liberty. In the courſe of three weeks, or a month, the buds will require to be looſened of the bandage, and which, if not executed in time, will be highly injurious to them; but they ſhould not be wholly diveſted of the binding, it being proper to tie them again ſlightly, by which the bark of the ſtock will be prevented from becoming open, which ſometimes takes place, and the bud is thereby greatly injured, if not wholly deſtroyed.

There is nothing further required until the following March, when the ſtock ſhould be cut off about three inches above the place of inoculation, ſloping it the contrary way to the bud. This length of ſtock left is beneficial in faſtening the ſhoot which ſprings from the bud, and which might otherwiſe be blown out by ſtrong winds: in the autumn following, however, it ſhould be cut away quite cloſe juſt above the bud, that the wounded part may the more readily become barked over.

It may be noticed, that the moſt proper ſeaſon for this ſort of work is, from the middle of June until the middle of Auguſt, according to the forwardneſs of the ſeaſon, and the particular ſorts of trees to be increaſed; but it may be eaſily known by trying whether the buds will come off well from the wood or not. The moſt general rule is, when the buds are found to be formed at the extremity of the ſame year's ſhoots, which is a ſign of their having finiſhed their vernal growth. The firſt ſort commonly inoculated is the apricot, and the laſt that of the orange-tree, which ſhould never be done until the middle of Auguſt.

In doing this ſort of work, choice ſhould be made of cloudy weather, as when done in the middle of the day, in very hot weather, the ſhoots perſpire ſo faſt as to leave the buds deſtitute of moiſture; nor ſhould the cuttings be taken off from the trees long before they are uſed; but if fetched from ſome diſtance the leaves ſhould be cut off, but all the foot-ſtalks left, and then wrapped up in wet moſs, and put in a tin-box to exclude the action of the external air upon them. But the practice of throwing cuttings into water is highly improper, as it ſaturates the buds ſo with moiſture, that they have no attractive force left to imbibe the ſap of the ſtock, for want of which they very often miſcarry, and diſappoint the operator.

It has been remarked by Mr. Forſyth, that when the pear-trees which are grafted in the ſpring have not taken, he would adviſe the cutting them off a little below the graft at a joint or bud. The tree then throws out a great number of healthy ſhoots; all of which ſhould be rubbed off, except ſo many as are ſufficient to fill the wall; nailing thoſe up to prevent the wind from breaking them. About the latter end of July the ſhoots will be fit to inoculate, which ſhould then be done, leaving a little of the wood on the inſide of the bud when inſerted into the ſtock, and rubbing in ſome of the compoſition, tying on the baſs at the ſame time.

Having grafted ſome ſummer bonchrêtiens with the bergamot de Paſque (or Eaſter bergamot) and pear d'Auch in the ſpring, moſt of which failed, he cut them off below the grafts, and in July following they had produced ſhoots from five to ſix feet long, which he inoculated in the latter end of that month with the before-mentioned ſorts, which all took. About the beginning of September he ordered the baſſes to be ſlackened; which being left too looſe, the barks began to ſeparate. He then made them be tightened, letting them remain till the following ſpring. About the beginning of April, when he ſaw the buds begin to ſhoot, he cut the ſhoots near to the buds; but finding many where the bark had not united, and ſome of the eyes apparently dead, he took a ſharp penknife and cut out all the decayed bark, rubbing in ſome of the compoſition in a liquid ſtate, till the hollow parts were filled up; he then ſmoothed it off with the finger even with the bark of the ſtock. He alſo rubbed ſome of the compoſition over thoſe eyes that were in the worſt ſtate, being quite black, but with very little hope of recovery. " To his great aſtoniſhment, many of thoſe which ſeemed perfectly dead recovered, and by the middle of July had ſhoots from five to ſix feet long (many of the ſhoots which took well having fruit-buds formed for next year), and covered a ſpace of wall larger than a young tree would have done in eight years; all the cavities where he cut out the dead bark and applied the compoſition were, in the courſe of the ſummer, filled up with ſound wood, and the bark between the ſtocks and grafts perfectly united.

" Three years ago he inoculated ſome brown beurrés and craſanes with pear d'Auch, one of which now covers a wall ſixteen feet high and fifteen long, and has more fruit on it this year than a maiden tree would have produced twenty years after planting." But he " never recommends inoculating or grafting of old trees, except when bad ſorts, or more of any ſort is wanted for a ſupply; in that caſe he would recommend to inoculate or graft with pear d'Auch, colmars, and winter bonchrétiens, which keep much longer than beurrés, craſanes, &c."

But for ſtandards that have been grafted in the ſpring and have miſſed, he adviſes that they ſhould be cut below the graft, as, when ſo treated, they throw out a great number of ſhoots, which ſhould by no means be too ſoon thinned, as in that caſe they will be liable to be broken by the wind. The weakeſt ſhoots may be begun to be taken off about the latter end of May or beginning of June. About the middle of the latter month they will have acquired conſiderable ſtrength, then thin them, leaving as many ſtrong regular ſhoots, and of thoſe neareſt the top of the ſtem, as will form a handſome head. If the ſtem be very ſtrong, it will be neceſſary, perhaps, to leave more than are intended to be inoculated on purpoſe to receive the ſap, which will flow in great abundance from a large trunk, and without this precaution be apt to burſt the ſhoots. He has often ſeen ſhoots as large as his arm burſt by a ſuperabundance of ſap. When that is likely to happen, the beſt thing is to ſcarify the ſhoots and rub a little of the compoſition into the wound. See Bud, Budding, and Grafting.

INOCULATION, among *Gardeners*, ſignifies an operation in the management of ſome ſorts of fruit-trees, which is frequently denominated *budding*. See Budding, and the preceding article.

Inoculation, in a *ſurgical* and *medical* ſenſe, denotes the practice of deſignedly communicating from one perſon to another certain diſeaſes, which is generally done by introducing ſome of the infectious matter into a ſmall wound, or puncture, made with the point of a lancet. The common purpoſe of ſuch operation is to diminiſh the ſeverity and peril of a diſtemper, which, taken in a caſual way, proves exceedingly deſtructive, and the hazard of catching which, at ſome period of life or another, is very conſiderable. A chief object of the plan is alſo, in general, to render the patient incapable of being again affected by the dreaded contagion. Hence inoculation is ſeldom performed, but for a diſeaſe with which the human conſtitution can only be affected once, as the ſmall-pox and cow-pox. The latter, which is ſo mild as ſcarcely to deſerve the name of a diſeaſe, being only communicable by contact, and exiſting originally no where except upon the teats and udders of cows, would never perhaps have troubled any other perſons than a few milkers, had it not been for the diſcovery of the important fact, that perſons who had undergone the complaint were made completely unſuſceptible of the ſmall-pox contagion. The cow-pox inoculation has now, therefore, been very generally ſubſtituted for that with variolous matter, and the beneficial conſequences of this change are ſo truly important that the Jennerian diſcovery will ever be regarded as a moſt memorable event, not only in the annals of medicine and ſurgery, but in the hiſtory of the world. See Cow-Pox and Vaccination.

Although it is our intention to devote this article to the hiſtory of the ſmall-pox inoculation, we may here remark, that the meaſles have been propagated by inoculation. Dr. Home, of Edinburgh, was the firſt who actually made the experiment. Not being able to collect either matter, or a ſufficient quantity of broken cuticle at the time of deſquamation, to produce the diſeaſe, he drew blood from a ſuperficial cutaneous vein, where the eruption was thickeſt. Cotton was then dipped in this blood, and applied to a wound made in each arm of the perſon about to be inoculated. In this manner Dr. Home inoculated twelve perſons. The eruptive fever generally began ſix days after inoculation; the ſymptoms were leſs ſevere; the cough was milder, or entirely abſent; and the inflammation of the eyes was trifling. Notwithſtanding Dr. Home's ſucceſs, inoculation for the meaſles is ſeldom or never practiſed, others, who have made the experiment, not having given reports equally favourable.

Inoculation for the plague has likewiſe been tried, in order to aſcertain whether that diſtemper might not be rendered leſs fatal and leſs prevalent in particular parts of the world. In Egypt, Dr. Whyte inoculated himſelf with matter taken from the buboes of an infected perſon. The attempt failed twice; and the third proval fatal in three days after the commencement of the ſymptoms. See ſir R. Wilſon's Hiſt. of the Expedition to Egypt.

In the preſent ſtate of our information, inoculation for the plague appears unjuſtifiable. It was aſcertained in Egypt, that many of the convaleſcents took the plague a ſecond time; nor, in all probability, does inoculation render this diſtemper milder. Indeed, what M. Sonnini obſerves, ſeems to lead to a contrary concluſion; for he mentions, that a Ruſſian ſurgeon, who was a priſoner at Conſtantinople, with a number of his countrymen, took it into his head to inoculate theſe unfortunate men with the plague, under the idea of rendering the contagion leſs deſtructive; but the reſult was, that two hundred loſt their lives, as well as the ſurgeon, who had alſo inoculated himſelf. See Sonnini's Travels into Greece and Turkey, p. 497.

The idea of intentionally imparting any kind of diſeaſe to the human body would appear, to perſons unacquainted with the reaſon of the thing, equally extraordinary and cruel. But the deſign and utility of the inoculation for the ſmall-pox are now ſo fully known among all claſſes of ſociety, as ſcarcely to need explanation. When it is remembered, that the ſmall-pox contagion has, at various periods, nearly depopulated extenſive kingdoms, and occaſioned greater devaſtation than the moſt deſtructive wars, any meaſure, calculated to render milder ſo terrible a diſeaſe, muſt be looked upon as a diſcovery of the very higheſt importance. It has been eſtimated, that, upon an average, before the introduction of inoculation, one out of every ſix perſons affected with the natural ſmall-pox, or ſometimes even a half, periſhed; but that the proportion of deaths, among ſuch as have been inoculated in the moſt improved manner, does not amount to more than one in ſeveral hundreds. Beſides this circumſtance, we have to mention, that before inoculation became common, the ſmall-pox frequently committed ravages like the plague, and the fury of the diſtemper was always dreadful whenever the contagion made its firſt viſit to a country. If, then, we are to hail the ſmall-pox inoculation as a general and momentous benefit to ſociety, on the principles juſt now ſpecified, with what joy and admiration muſt we behold the diſcovery of a complete ſecurity againſt the ſmall-pox infection, in the new and perfectly ſafe kind of inoculation with vaccine lymph. The ſmall-pox inoculation materially alleviated the calamities ariſing from that contagion, by making the diſeaſe milder, and leſſening its mortality. But, ſtill, the diſtemper was not unfrequently ſeen in a ſevere form; at leaſt one out of every three or four hundred inoculated died; and the countenances of thoſe who ſurvived were often miſerably pitted and diſfigured. On the other hand, the vaccine inoculation hardly ever produces any ſerious indiſpoſition, and being followed by no eruption, cannot deform the face. Its ſafety and efficacy are daily receiving more and more confirmation from all quarters of the world, and we have no doubt that, after prejudices have had time to ſubſide, the ſmall-pox inoculation will be univerſally ſuperſeded.

The original introduction of inoculation, however, will always conſtitute a moſt memorable event in hiſtory, and is a ſubject too intereſting to be omitted in our work. After a few obſervations on the commencement of the ſmall-pox, we ſhall therefore endeavour to give ſome account of the riſe and progreſs of the practice.

Origin of the Small-pox.—The ſmall-pox, like the meaſles, and ſeveral other diſeaſes, is produced by a matter *ſui generis*, or, in other words, by a ſpecific contagion, and it has originated from cauſes ſo perfectly incomprehenſible, as to ſet at defiance all rational conjecture. From the ſilence of the ancient Greeks and Romans reſpecting a diſeaſe ſo very fatal, and of ſuch peculiarity, as the ſmall-pox, it is reaſonable to conclude, that its date is ſubſequent to their times, and, conſequently, that the world exiſted ſeveral thouſand years before it was viſited by this dreadful peſtilence. Rhazes, an Arabian phyſician, who practiſed at Bagdad in the beginning of the tenth century, is one of the oldeſt writers on the ſmall-pox, whoſe works are ſtill extant. On this ſubject, however, he quotes ſeveral of his predeceſſors, the moſt ancient of whom is Ahron, who was a prieſt and phyſician at Alexandria, when that city was beſieged by the Saracens. Ahron's book has, therefore, been deemed the firſt in which any notice is taken of the ſmall-pox. The introduction of the diſeaſe, at that time, into Egypt, might have been by the armies of Amrou, which, in the kaliphate of Omar, poured in thither from Arabia.

The celebrated Dr. Friend conceived, that the Arabians might originally have derived the contagion from ſome of the more diſtant regions of the Eaſt, and Père D'Entrecolles, a miſſionary jeſuit at Pekin, informs us, that, upon looking over ſome Chineſe books, he found the ſmall-pox mentioned in them as a diſeaſe known in very ancient times. See "Lettres edifiantes et curieuſes," tom. 21. p. 33. ed. 1781.

Mr. Holwell, a Bengal ſurgeon, has likewiſe endeavoured to confirm the accuracy of Dr. Friend's opinion, obſerving, that, "at the period in which the Aughtorrah Bhade ſcriptures of the Gentoos were promulged, (according to the Bramins 3366 years ago,) this diſeaſe muſt then have been of ſome ſtanding, as thoſe ſcriptures inſtitute a form of divine worſhip, with poojahs, or offerings, to a female divinity, ſtyled by the common people Goote ka Tagooran, the Goddeſs of Spots, whoſe aid and patronage are invoked during the continuance of the ſmall-pox ſeaſon; alſo in the meaſles, and every cutaneous eruption that is in the ſmalleſt degree epidemical. See "An Account of the Manner of inoculating the Small-pox in the Eaſt Indies," p. 7.

On the other hand, Dr. Woodville is unwilling to admit, that the ſuppoſed antiquity of the ſmall-pox in India is at all proved by what D'Entrecolles and Mr. Holwell have obſerved. He remarks, that the former has adduced no direct fact, ſhewing, that the diſeaſe was really deſcribed by the ancient Chineſe phyſicians; while Mr. Holwell's reaſons muſt be inconcluſive, not only as founded on the verity of the Hindoo chronology; but becauſe the Goddeſs of Spots was not ſuppoſed to preſide over any particular eruptive diſorder, but over all cutaneous affections that were epidemical. Beſides, as Dr. Woodville juſtly notices, had the ſmall-pox exiſted in India more than 3366 years, it could not fail to have been tranſported in early times both to the Greeks and Romans, by the conſtant intercourſe, which they indirectly maintained with the Indian nations.

Dr. John James Reiſke mentions, that, in an old Arabic MS. preſerved in the public library at Leyden, he read, that, in the year of the birth of Mahomet, the meaſles and ſmall-pox made their firſt appearance in Arabia. Diſp. inaug. Lugd. Bat. 1746. Now it appears alſo from ſome Arabian annals, procured by that adventurous traveller, Mr. Bruce, that the era of the firſt appearance of the ſmall-pox in Arabia attaches to that of the ſiege of Mecca, and that the Abyſſinian army, commanded by Abrahah, was the firſt victim of its fury. Mr. Gibbon ſtates, that the ſiege of Mecca happened only two months before the birth of Mahomet; a fact, which Dr. Woodville points out as deſerving very particular notice; for if the year of the birth of Mahomet be aſcertained to be alſo that of the ſiege of Mecca, the Arabian MS. cited by Dr. Reiſke, and that written by Hameeſy, the Arabian author mentioned by Mr. Bruce, perfectly coincide. According to Gibbon, Mahomet was born A.D. 569; which, on the above independent authorities, is to be conſidered as the period when the ſmall-pox firſt made its appearance in Arabia.

From this era, to that of the conqueſt of Alexandria in 640, no traces of the exiſtence of the ſmall-pox are to be diſcovered; but the diſeaſe certainly ſpread into that city at the time it was inveſted by the Saracens; and, as Dr. Woodville ſtates, it may therefore be ſuppoſed to have been brought into Egypt by the Mahometan army, which, ſix years before, had invaded Perſia and Syria, where this deſtructive peſtilence probably had already made a conſiderable progreſs.

After this period, to the revival of literature in the 15th century, ſucceeded that general ſtate of ignorance and barbariſm, during which the preſent ſubject, in common with many others, is ſo obſcured in the darkneſs of the times as to elude the moſt diligent reſearch.

It is manifeſt from the works of Rhazes, that many of the Arabian phyſicians had written on the ſmall-pox before the 10th century; and notwithſtanding the Saracen hiſtory is ſilent on the ravages which muſt have accompanied the general diffuſion of the ſmall-pox during the empire of the caliphs, the progreſs and prevalence of the diſtemper are to be inferred from collateral evidence. Thus, the caliph Yezid, who died in 683, is mentioned as being pitted with the ſmall-pox; and the caliph Abul-Abbas Alſaffah actually died, in 753, of this diſeaſe.

The time when the ſmall-pox contagion firſt ſpread into Great Britain is involved in doubt. Moſt writers ſuppoſe that the diſtemper was imported into Europe by the cruſaders, upon their return from the Holy Land in the 13th century. The improbability of this ſtatement is inſiſted upon by Dr. Woodville, who adverts to the known activity of variolous matter, the long time it retains its infectious quality, and the unlikely circumſtance of the ſmall-pox prevailing ſix or ſeven centuries over various parts of Aſia, having free intercourſe with Europe, before it was conveyed into this kingdom. It is indeed ſurpriſing, that the dreadful effects which muſt have attended the firſt introduction of the ſmall-pox into this as well as any other country, have eſcaped the notice of all our hiſtorians and medical writers. But, by examining ſome of the MSS. of the Harleian and Cottonian collections, preſerved in the Britiſh Muſeum, and bearing indubitable evidence of having been written before the year 900, Dr. Woodville ſucceeded in tracing the exiſtence of the ſmall-pox in our iſland, and on the neighbouring continent, long before the cruſades took place. In theſe curious records the word *variolæ* occurs ſeveral times in the ſame ſenſe in which it is now uſed. We likewiſe learn from the MSS. that the people in thoſe early times lived in continual dread of the ſmall-pox, as ſeveral prayers, exorciſms, and incantations, to which they had recourſe for preſervation, are to be found. Dr. Woodville refers us to No. 585, of the Harleian Catal. vol. i. and Bibl. Cotton. Caligula A. 15. No. 30.

The firſt Britiſh medical writers of any note were thoſe of the 13th century, and they, as well as all their ſucceſſors, from John of Gaddeſden to the immortal Sydenham, &c. have beſtowed much attention on this important diſtemper.

Hiſtory of Inoculation of the Small-pox.—The exact part of the world where inoculation was firſt adopted is quite unknown ; nor do we poſſeſs any information of the circumſtances which originally ſuggeſted the benefit that might reſult from the practice. From the Arabian phyſicians having been the firſt informed of the nature and treatment of the ſmall-pox, it has been ſuppoſed that inoculation had its origin among them. (See Second Memoire ſur l'Inoculation par M. de la Condamine.) Avicenna, who lived at Bokhara on the eaſt coaſt of the Caſpian ſea, or his diſciples, have in particular been ſuſpected of being the authors of this valuable invention, in conſequence of the countries between the Caſpian and Euxine ſeas being the ſuppoſed centre from which inoculation ſpread to other places. Dr. Woodville, however, conſiders this conjecture as very ill-founded. He contends that we have no evidence that any of the people near the Caſpian ſea were the firſt practiſers of inoculation. Had the invention originated in this part of the world, the Tartars could hardly have been ſo ignorant of the practice, as, according to D'Entrecolles, they actually were in the year 1724. Nor is it probable that the method ſpread from weſt to eaſt ; for as the ſame author has obſerved, inoculation is more ancient in the eaſtern parts of China than it is in the weſtern provinces of that empire. Dr. Woodville remarks that inoculation was certainly firſt introduced into Conſtantinople from the Morea ; but as the event did not take place till towards the end of the 17th century, we may conclude, that, had the art been practiſed for many ages, at ſo ſhort a diſtance from that metropolis, it would have been known there much ſooner. Beſides, in various countries, very remote from the Caſpian ſea, it is proved to have been an immemorial uſage.

Inoculation was introduced into London as a foreign invention, and, from its ſucceſs upon the younger branches of the royal family in 1722, became the ſubject of public converſation, when, to the great ſurpriſe of the learned, ſeveral communications proved that it was already a practice known in South Wales, where it had exiſted under the denomination of buying the ſmall-pox as far back as tradition could be traced. The manner of inoculating, or buying the ſmall-pox, here alluded to, was ſubject to variety. Some perſons either rubbed the matter, taken from the puſtules, when ripe, on ſeveral parts of the ſkin of the arms, &c. or pricked ſuch parts with pins, or other pointed things, firſt infected with the ſame matter. Some ſcraped the ſkin with a knife, until the blood began to flow, before they applied the variolous pus. Others produced the diſtemper by holding a certain number of dried puſtules, for a conſiderable time, in the palm of the hand. (See the Letters of Dr. Williams, Mr. Owen, and Mr. Wright, in the Philoſophical Tranſactions for 1722, and Dr Jurin's account of the ſucceſs of inoculation in 1723.) The inhabitants of the Highlands of Scotland have alſo for many ages performed a kind of inoculation by tying worſted threads, moiſtened with variolous matter, round the wriſts of their children. (Monro on Inoculation in Scotland.) The ſame cuſtom likewiſe prevailed in many other parts of Europe, Aſia, and Africa ; and, what is highly curious, the practice was, in ſeveral of theſe diſtant countries, termed *buying the ſmall-pox*, juſt as it was in South Wales ; for it was ſuperſtitiouſly imagined that inoculation would not produce the proper effect, unleſs the perſon from whom the variolous matter was taken received a piece of money, or ſome other preſent, in exchange. The practice of buying the ſmall-pox has been found to have prevailed from time immemorial, not only in South Wales, but alſo at Naples, Pavia, in Auvergne and Perigord, and among the peaſantry in many parts of Germany, Denmark, and Sweden. See Second Mem. ſur l'Inoculation, par M. de la Condamine ; Murray's Hiſtoria Inſitionis Variolarum in Suecia ; Schultz's Account of Inoculation, &c.

In Barbary and the Levant the variolous matter was alſo purchaſed, and inſerted in a ſmall inciſion made in the fleſhy part of the hand between the thumb and the fore-finger. (See Shaw's Travels into Barbary and the Levant.) In Tripoli, Tunis, and Algiers, an inciſion was made on the back of the hand, between the thumb and fore-finger, and a little of the variolous matter put into the wound. According to Dr. P. Ruſſel, inoculation is ſo ancient in theſe laſt kingdoms that nobody remembers its firſt riſe ; and it has been practiſed not only by the inhabitants of the towns, but alſo by the wild Arabs. (See Phil. Tranſ. vol. lvi. p. 140.) It appears, moreover, from this gentleman's account, that buying the variolous matter and inoculating have been ancient cuſtoms at Bagdad, Moſul, and Baſſora, in Armenia, at Damaſcus, and all along the coaſt of Syria and Paleſtine. The Arabs aſſured Dr. Ruſſel that the puncture might be made indifferently in any fleſhy part ; but he moſtly found the mark between the thumb and fore-finger. Some of the Georgians had been inoculated in the ſame part, though moſt of them in the fore-arm. Some of the Armenians had been inoculated in both thighs ; but the greater part, like the Arabs, bore the mark upon the hand.

D'Entrecolles, by obtaining acceſs to ſeveral medical books at Pekin, diſcovered one in which an account was given of the introduction of inoculation into China. The author of the book here alluded to, lived in the latter part of the dynaſty of Ming. Hence it has been concluded that inoculation has not yet been practiſed in China 200 years. But in Hindooſtan the cuſtom can be traced much farther back. The methods of practiſing this art by the Chineſe and Hindoos are alſo ſo widely different, that they cannot have been derived from the ſame origin. The Chineſe take from two to four dried variolous puſtules, or ſcales (according to their ſize), between which they place a ſmall portion of muſk ; the whole is then wrapped up in cotton, and introduced into the patient's noſtril. The ſcales before uſed are kept in a cloſe jar for ſeveral years, and when the Chineſe are obliged to employ recent puſtules, they think it neceſſary to correct the acrimony of the matter, by expoſing it to the ſteam of an infuſion of the roots of ſcorzonera and liquorice. They ſometimes reduce the dried ſcales into powder, and form them into a paſte for the purpoſe of inoculation.

Dr. Woodville very properly obſerves, that the application of variolous matter, wrapped in cotton, within the noſtrils, muſt be an exceedingly precarious mode of communicating the ſmall-pox, and may perhaps afford a reaſon why inoculation in China is leſs ſucceſsful than in other countries ; for if the matter acts in the way of inoculation, a troubleſome inflammation of the Schneiderian membrane muſt enſue ; and, ſhould not this take place, the variolous effluvia, by being inhaled into the lungs, will produce the natural ſmall-pox.

In Hindooſtan inoculation is performed by a particular tribe of Bramins. They do not refuſe to inoculate on any part ; but, in males, they prefer the outſide of the arm, midway between the wriſt and the elbow, and, in females, the ſhoulder. The operator firſt rubs the part with a dry cloth for eight or ten minutes, and then ſlightly pricks it at many points. He next takes a ſmall pledget of cotton, charged with the variolous matter, moiſtens it with two or three drops of the Ganges water, applies it to the punctured part, fixes it there with a bandage, and orders it to be kept on for ſix hours. The bandage is then to be taken off, the pledget being left to fall off of itſelf. The matter in the cotton is always taken from puſtules of the preceding year, freſh matter, and ſuch as is the product of the natural ſmall-pox, being conſidered improper. See Holwell's Account of the Manner of inoculating in the Eaſt Indies.

It was immediately from Conſtantinople that the Engliſh firſt derived a full knowledge of the advantages of inoculation. The beneficial conſequences of the practice among the Turks, were detailed by Dr. Emanuel Timoni, communicated by Dr. Woodward to the Royal Society, and publiſhed in the Tranſactions of that body for the year 1714. The Byzantine mode was to take ſome freſh variolous matter in a glaſs veſſel, and drop it on punctures or ſcratches made with a needle or lancet in any fleſhy part, but eſpecially in the arm and fore-arm. The matter, which was dropped on the punctured place, was well blended with the drops of blood iſſuing from the wounds, by means of a blunt ſtile or ear-picker. The part was then kept covered with a walnut ſhell for a few hours, in order to prevent the matter from being rubbed away.

Another account of the Byzantine mode of inoculation was afterwards publiſhed by Dr. Pylarini in the ſame volume of the Tranſactions of the Royal Society for 1716. But the year before this gentleman's obſervations appeared, ſurgeon Kennedy had printed an account of the new method of inoculating at Conſtantinople, in his "Eſſay on External Remedies," and he ſeems to be the firſt Britiſh author on the ſubject of inoculation. Soon afterwards, lady Mary Wortley Montague, the wife of the Engliſh Ambaſſador at Conſtantinople, in her letters, confirmed the accounts of the remarkable manner in which the ſeverity and mortality of the ſmall-pox were diminiſhed among the Turks by means of inoculation; and, in one of her epiſtles from Adrianople, ſhe expreſſed her intention to try the experiment upon her own little ſon. See vol. ii. let. 31.

The mode of performing the operation at Conſtantinople gradually became more and more ſimple. We learn from Pylarini, that, in 1701, inciſions were made in the forehead, cheeks, chin, and alſo in the extremities, for the purpoſe of inoculation. Timoni likewiſe, twelve years afterwards, mentions, that the operator is to make ſeveral little wounds in one or more places of the ſkin, and theſe ſucceed beſt in the fleſhy parts of the arm. In the year 1717, the inſertion of variolous matter, at a ſimple puncture in each arm, ſeems to have been the prevailing method of inoculation, as will appear by the following relation: Mr. Maitland, ſurgeon to the honourable Wortley Montague in his diplomatic character at the Ottoman court, informs us, that the ambaſſador's lady, being convinced of the advantages of inoculation, determined that her only ſon, then ſix years of age, ſhould undergo the operation. For this purpoſe, ſhe deſired Mr. Maitland to procure the variolous matter from a proper ſubject, which being done, an old Greek woman, many years in the conſtant habit of inoculating, was employed to inſert it. "But (ſays Mr. Maitland) the good woman went to work ſo awkwardly, and, by the ſhaking of her hand, put the child to ſo much torture with her blunt and ruſty needle, that I pitied his cries, and therefore inoculated the *other arm* with my own inſtrument, and with ſo little pain to him, that he did not in the leaſt complain of it." (Maitland's Account of Inoculating the Small-pox, p. 7.) The conſequent diſeaſe was very mild, and, if the mode of buying the ſmall-pox be excepted, this inoculation, which was done at Pera, near Conſtantinople, in March 1717, was the firſt ever practiſed upon any Engliſh ſubject.

The inoculation of the ſmall-pox was firſt regularly adopted in England in the month of April 1721. The practice, in all probability, would not have been ſo ſoon purſued by the faculty, had it not been for the enlightened and philoſophic mind of lady Mary Wortley Montague. After this celebrated lady had witneſſed the good effects of inoculation upon her ſon at Pera, ſhe determined alſo to try it upon her daughter, then an infant three months old; but for certain domeſtic reaſons, the operation was at that time deferred, ſo that this child was fortunately reſerved to be the firſt example of inoculation in England, which was done by Mr. Maitland, in April 1721. According to Dr. Woodville, writers have univerſally erred, in dating this event in April 1722, and making it ſubſequent to the inoculation of the malefactors at Newgate. He notices that Mr. Maitland's pamphlet, in which all the circumſtances are ſtated, was publiſhed in February 1722, as appears by the advertiſement prefixed to the work. Therefore Mr. Maitland, in ſaying April *laſt*, could mean no other than that in the year 1721. Beſides, Mr. Maitland expreſsly mentions, that this was the firſt example of inoculation in England.

After the ſucceſsful reſult of this caſe, Mr. Maitland performed the ſecond inoculation ever done in this country, in the month of May 1721, upon the ſon of Dr. Keith, and with the beſt effects. Notwithſtanding theſe confirmations at home of the favourable accounts of the practice which had been already received from Conſtantinople, and notwithſtanding the firm and powerful patronage which the Byzantine inoculation met with in lady Mary Wortley Montague, it is a fact, that ſuch was the ſuſpicious caution with which the method was received, that ſeveral months elapſed before a third trial of it was made in London. Indeed, the very next experiment that was undertaken ſtrikingly evinces the dangerous light in which inoculation was ſtill regarded; for it was determined that ſeveral culprits in Newgate, who had forfeited their lives to the laws of their country, ſhould, on ſubmitting to be inoculated, receive full pardon by the royal prerogative. Six condemned criminals were inoculated by Mr Maitland, on the ninth day of Auguſt 1721, in the preſence of ſeveral eminent phyſicians and ſurgeons. Theſe malefactors all obtained a remiſſion of their ſentence on very eaſy terms. None of them had the diſeaſe ſeverely, and one, who had already had the ſmall-pox, was of courſe not affected a ſecond time. A ſeventh criminal, a young woman, was next pardoned, on condition of having the Chineſe method of inoculating tried upon her, at the wiſh of Dr. Mead. Conſequently, ſome cotton, moiſtened with variolous matter, was introduced in her noſtrils; the diſtemper followed in a mild form: but the patient ſuffered violent pains in her head, from the commencement of the eruption to the maturation of the puſtules.

After theſe public proofs of the ſafety and advantage of inoculation, objections and doubts were ſtill adduced againſt the method. Some conſidered the caſes too few, while others, in conſequence of the ſmall number and mildneſs of the puſtules, thought it doubtful whether the genuine ſmall-pox had been at all communicated. Hence, in the courſe of the following ſix months, Mr. Maitland inoculated only eight ſubjects, who all recovered, though two, it muſt be confeſſed, had the ſmall-pox ſo ſeverely, as to be for ſome time in danger. See Maitland's Account of Inoculating the Small-pox, 1722.

Maitland's publication was immediately afterwards followed by a letter from Dr. Nettleton, who, in December

1721, and the two ſubſequent months, had inoculated with ſucceſs upwards of forty perſons at Halifax, in Yorkſhire. This relation influenced the public very conſiderably in favour of the new mode of communicating the ſmall-pox.

Early in the ſpring of the year 1722, inoculation began to be adopted in various parts of England; and by order of her royal highneſs the princeſs of Wales, it was practiſed firſt upon ſix, and afterwards upon five charity children, belonging to the pariſh of St. James's. The ſucceſs of theſe trials induced her royal highneſs to have the princeſſes Amelia and Carolina inoculated on the nineteenth of April 1722, by ſerjeant ſurgeon Amyand. Both theſe younger branches of the royal family paſſed through the ſmall-pox, in a very favourable manner; and inoculation, in conſequence of this illuſtrious example, was now making a rapid progreſs: when unfortunately the practice received a great check, by the death of the earl of Sunderland's ſon, and by that of lord Bathurſt's ſervant, after being inoculated. A Miſs Rigby alſo died, about eight weeks after her inoculation, making the third death. Therefore, out of 182 inoculations, in 1721 and 1722, three died; or nearly one in ſixty.

About the time when the firſt death happened in London, accounts were received in town, ſtating that the practice had been tried to a much greater extent in New England. It appears that, after an abſence of nineteen years, the ſmall-pox had broken out with a great mortality at Boſton, in April 1721. This induced the Rev. Mr. Mather to publiſh the account of inoculation, as related in the Philoſophical Tranſactions by Timoni and Pylarini. This publication, which was diſtributed to all the medical practitioners at that place, was the means of inciting Dr. Boylſton to commence the practice of inoculation upon his own child, and two negro ſervants, at the latter end of June 1721. In the courſe of ſix months, he inoculated in and about Boſton 244 perſons. Of this number ſix died.

The reports which came from New England, were employed with great exaggeration by the opponents of inoculation, who ſeized with avidity every circumſtance that might have the leaſt tendency to retard the progreſs of the improvement.

During 1723, the practice of inoculation became much more general in England, the number of inoculated this year far exceeding the numbers in the two preceding years taken together. It amounted to 292, which, added to 182, makes the whole number of inoculations in the years 1721, 1722, and 1723, to be 474, of which number, according to Dr. Jurin, nine died.

It deſerves notice, that ſeveral of theſe nine caſes were not generally admitted as deaths altogether in conſequence of inoculation. But even allowing that they were ſo, the chance of recovering from the inoculated ſmall-pox muſt appear infinitely greater than from the caſual. For it was proved, that at this time, out of 14,559 perſons who had been affected with the natural ſmall-pox, 2351 died; nearly one in ſix, or five out of thirty-one.

In 1724, there were only forty perſons inoculated. Their royal highneſſes prince Frederick and prince William, however, were in this ſmall liſt. Dr. Jurin accounts for the ſeeming decline of inoculation this year, by the fact that people will not eaſily ſubmit to a practice in which they apprehend riſk, unleſs impelled by the dread of a greater danger. Now it appears that in 1724, the natural ſmall-pox was much leſs fatal than in 1722 and 1723, and it is to this cauſe we are to refer the above ſmall number of inoculations. That the practice had not fallen into diſrepute is manifeſt; for Dr. Jurin informs us that in 1725 the natural ſmall-pox was very mortal, and of courſe, people being frightened, reſorted to inoculation again in a larger number. Of the above-mentioned forty, one is recorded to have died.

In 1725 and 1726, 256 perſons were inoculated, of which number four died.

In the years 1727 and 1728, the practice of inoculation did in reality begin to decline; for, though the ſmall-pox was very prevalent and fatal, only 124 inoculations took place in theſe two years, and three of the caſes proved fatal.

We find that up to 1729, 897 perſons had been inoculated in England, of whom ſeventeen are reported to have died. But on the other hand, the records ſhew, that of 18,229 perſons, who had been affected with the natural ſmall-pox, during the firſt eight years of inoculation, 3008 died under the diſeaſe; or about one in ſix; whereas, the deaths by inoculation, admitting the utmoſt number contended for, does not exceed one in fifty. The reaſon why more died of inoculation at this early period of the practice than has been the caſe of late years, is juſtly aſcribable to the better manner lately adopted of treating inoculated patients. Beſides, formerly it was common to inoculate adults, in whom the diſeaſe is more diſpoſed to aſſume a ſevere form than in children.

Inoculation was not regularly practiſed in Scotland till the year 1726, when Mr. Maitland performed this operation upon ten perſons; but as one of theſe caſes was unſucceſsful, the practice was diſcontinued in that country for twenty years afterwards, and was not revived again without conſiderable difficulty. At Dumfries, indeed, where the caſual ſmall-pox had committed great ravages, inoculation was had recourſe to in 1733; but in moſt other parts of North Britain the method was not introduced till 1753.

In Ireland, inoculation was firſt performed at Dublin in 1723. Twenty-five perſons were inoculated in that and the three following years. Of this ſmall number, three caſes terminated fatally.

Inoculation at Hanover was firſt performed in 1724, by Mr. Maitland, upon his royal highneſs prince Frederick, and afterwards upon eight children of the Baron de Schulenberg. The example and ſucceſs of theſe caſes had the effect of eſtabliſhing the practice in that country.

After 1729, inoculation was ſeriouſly on the decline in England; but it made conſiderable progreſs in the tranſatlantic world. In South Carolina, about the year 1738, not leſs than 800, or 1000 perſons were inoculated, of whom only eight died. The account of this ſucceſs contributed materially to revive the practice in Great Britain. In Philadelphia, likewiſe, inoculation proved ſoon afterwards ſtill more favourable; and in St. Chriſtopher's 300 ſlaves were inoculated, without the loſs of one.

Such facts in favour of the practice, and the great fatality of the natural ſmall-pox in Britain, ſoon led people to adopt inoculation more extenſively than ever, and from the year 1738, this beneficial method may be regarded as having been completely and generally eſtabliſhed, though partial oppoſition prevailed long afterwards.

In the year 1746, the inſtitution called the Inoculation Hoſpital had its riſe, though it was not at firſt ſo conſiderable an eſtabliſhment as at preſent. Here the ſucceſs of inoculation did not diſappoint the hopes and zeal of its patrons; for out of 593 caſes of perſons ſucceſſively inoculated, from the year 1751, only one proved unſucceſsful.

In 1754, it was determined to inoculate the three royal children, who had not yet had the ſmall-pox. In the mean time, his preſent majeſty took the diſeaſe caſually, ſo that only the prince Edward, and the princeſs Auguſta, were inoculated. Theſe great examples, and the public approbation of the practice declared by the College of Phyſicians, gained numerous advocates to the cauſe, which never afterwards loſt ground, till the ſtill ſafer and milder mode of inoculation with vaccine lymph was brought into notice by the immortal Jenner.

In France, Dr. Boyer is the firſt writer who has noticed inoculation, which he did in 1717. In 1723, the ſucceſsful trials of inoculation in England were publiſhed at Paris by Dr. de la Coſte, and the conſequence was a declaration by the phyſicians of that city, "that for the benefit of the public, it was lawful to make trials of inoculation." The practice was on the point of having a beginning in the hoſpitals, under the ſanction of the duke of Orleans, the regent, when, unfortunately for the experiment, this nobleman died, and ſoon afterwards Dr. Hecquet publiſhed his "Raiſons de doute contre l'Inoculation." The ſentiments contained in this publication, and in a theſis written at Paris in 1723, the reports of the ill ſucceſs of inoculation at Boſton, and the great mortality of the natural ſmall-pox in London, in 1723, falſely aſcribed to the new practice, ſoon brought the method into diſrepute in France, and the deſign of trying it there was laid aſide.

The French paid little attention to the ſubject again till 1752, when Dr. Buttini, of Montpelier, publiſhed at Paris his "Traité de la Petite Verole communiquée par l'Inoculation." Two years afterwards, M. de la Condamine read his excellent memoir upon the advantages of inoculation, before a public aſſembly of the Royal Academy of Sciences at Paris. But, according to Dr. Woodville, the practice was not introduced into France till the 1ſt of April 1755, when, at the deſire of M. Turgot, a child, four years old, was inoculated at Paris. On the 14th of May, M. Chaſtellux, aged 21, voluntarily ſubmitted to the operation. About this time, Dr. Hoſty, who had been attending the ſmall-pox and inoculation hoſpitals in London, at the requeſt of the French miniſter, publiſhed at Paris the following report :—"That out of 463 caſes of perſons laſt inoculated in the hoſpital, only one had been unſucceſsful; whereas, in the Small-pox hoſpital, it appeared by the regiſters, that nearly one in four had died of the natural ſmall-pox."—"That Mr. Ranby, principal ſurgeon to his majeſty, had inoculated 1600 perſons; and that Mr. Bell, pupil to Mr. Morand, had inoculated 903, without the loſs of one."—"That in order to form a juſt comparative view of the fatality of inoculation and of the natural ſmall-pox, it is only requiſite to viſit the two hoſpitals in London, the difference of their reports being ſo remarkable, that it muſt convince the moſt incredulous of the advantages of inoculation." Laſtly, "with reſpect to the inoculation of other diſeaſes along with the ſmall-pox, that no inſtance of the kind has ever been produced; and that perſons have been inoculated with variolous matter, taken from a patient affected with the venereal diſtemper, yet have thereby received the infection of the ſmall-pox only."

This ſtatement had immenſe effect in promoting the introduction of inoculation into France; and in the year 1756, the family of the duke of Orleans, and great numbers of the firſt rank, were inoculated by Drs. Tronchin, Hoſty, and others. In 1758, the practice had diffuſed itſelf over various parts of France. The inoculated were not, however, very numerous, and one or two unſucceſsful caſes, joined with falſe reports, that ſome perſons had taken the natural ſmall-pox after undergoing inoculation, once more caſt diſcredit upon the plan, and excited a violent controverſy. The great fatality of the ſmall-pox at Paris in 1763, being imputed to inoculation, the practice was forbidden by parliament. At length the faculty of phyſic, and that of theology, were called upon to decide, whether inoculation ought to be tolerated or proſcribed. This meaſure ſerved to increaſe the diſputes; nor was it till a very late period that inoculation was extenſively practiſed in France.

In Holland, inoculation was begun at Amſterdam in 1748 by Dr. Tronchin, who, on finding one of his ſons ſeized with the natural ſmall-pox, immediately inoculated the other. This phyſician, after his return from Geneva, in 1754, inoculated a great many perſons in Holland. Dr. Schwenke, at the Hague, likewiſe promoted the practice; and ſo did a ſociety of phyſicians and ſurgeons at Rotterdam, who were aſſociated for the purpoſe in 1757. The method was not, however, very generally adopted by the Dutch, till after 1764, about which time Morand and others had practiſed it at Amſterdam with ſtriking ſucceſs.

Inoculation was firſt introduced into Denmark in September 1754, when the counteſs of Bernſdorff underwent the proceſs. In 1758, two inoculation houſes were eſtabliſhed at Copenhagen; and, in 1760, the prince royal was inoculated with ſucceſs.

In Sweden, the firſt trial of inoculation was made by Haartman in 1754. The rapid progreſs of the method in Sweden was owing to the encouragement afforded by the Swediſh court. Dr. D. Schultz was deputed to enquire into the ſucceſs of the plan at the inoculation hoſpital in London, and the accounts which he gave upon his return to Stockholm in 1755, led to the eſtabliſhment of inoculation houſes in different parts of Sweden. In 1757, the benefits of inoculation were commemorated by a medal.

Inoculation was firſt introduced at Geneva in 1751, whence it paſſed into Switzerland in 1753. In the latter country, it was firſt performed at Lauſanne by a lady on her own child.

Inoculation commenced in Italy during the great mortality occaſioned in Tuſcany and Rome by the ſmall-pox in 1754. Dr. Peverini was the firſt inoculator, putting out of conſideration the cuſtom which had long prevailed in the interior of the country, of women ſometimes artificially communicating the ſmall-pox to their children. In 1755, M. de la Condamine was at Rome, where, by his writings and perſonal influence, he ſucceeded in reconciling many to the practice. Before 1765, inoculation was practiſed with ſucceſs at Venice, Padua, Verona, Breſcia, Mantua, Bologna, Milan, Parma, &c. In ſhort, Naples was the only important place where the method had not been introduced.

Inoculation was begun at Hanover almoſt as ſoon as in England. The oppoſition of De Haen, however, kept back the improvement in moſt other parts of Germany. The Pruſſians and Auſtrians were the laſt to adopt it. At Vienna, inoculation did not make any progreſs till 1765. The younger branches of the imperial family were inoculated in 1768, and ſhortly afterwards the emperor eſtabliſhed an inoculation hoſpital in the ſuburbs of Vienna.

Owing to ſome unfortunate events of the firſt inoculations at Berlin, the practice was ſoon diſcountenanced in Pruſſia, nor was it revived till 1774, when Dr. Baylies was invited from Dreſden to ſuperintend the method.

Although ſome perſons had been inoculated in Livonia by Dr. Schulenius at an earlier period, the practice was unknown at St. Peterſburgh till 1768, when it was eſtabliſhed there under baron Dimſdale. This event muſt have been to the Ruſſians an immenſe bleſſing, ſince in their country, the natural ſmall-pox uſed to rage with ſuch ſeverity, that it is ſaid to have annually deſtroyed two millions of ſubjects. On the 28th of July, 1768, baron Dimſdale inoculated the empreſs and the grand duke, both of whom ſpeedily recovered.

The practice made rapid progreſs; an inoculation hoſpital was eſtabliſhed; and at length Dimſdale returned to England loaded with wealth and honours.

In Spain, inoculation was not extenſively adopted before 1771, though it had been introduced by a ſurgeon forty-two years before at Jadrique, a ſmall town in that kingdom, and had not been diſcontinued in that particular place. Dr. Don Miguel Gorman viſited London for the purpoſe of learning the Suttonian method of inoculation, and returned to Madrid in 1772, where he practiſed the art upon ſeveral of the nobility to the great ſatisfaction of the court.

Of the Objections which were urged againſt Inoculation.—Having related the riſe and firſt progreſs of inoculation in ſeveral parts of the world, it ſeems proper, before reciting the particular methods purſued by the Suttons and baron Dimſdale, to notice the various objections and arguments which were adduced for the purpoſe of ſuppreſſing the practice of inoculation altogether. The clamour againſt the method, indeed, was for many years exceſſively violent; both phyſical and moral reaſons were brought forward againſt the ſyſtem, and men of different profeſſions entered into the controverſy.

1. To the objection that inoculation did not produce the genuine ſmall-pox, and conſequently could not ſecure any one from having the diſeaſe afterwards, the celebrated Dr. Mead made the following judicious reply. "Now I own I cannot underſtand how contagion, that is the very ſeed of the diſeaſe, ſhould produce not its own proper diſtemper, but another of a different kind. Neither, certainly, does it matter by which way the infection is received, provided it brings forth manifeſt marks of the diſeaſe. And as to thoſe, who, after having been inoculated with ſucceſs, are, notwithſtanding this, ſaid to have ſuffered the ſmall-pox, I muſt proteſt that, after the moſt diligent enquiry, I have not been able to find out one convincing proof of this kind. But to ſpeak plainly, if ſuch a thing happened once, why do we not ſee it come to paſs oftener? Or, what can a ſingle example, ſuppoſing it to be true and certain, avail, when innumerable have produced nothing like it?"

2. One formidable objection was, the ſuppoſed danger that inoculation might be the means of communicating other terrible and fatal diſeaſes, when the matter was taken from unhealthy ſubjects. The variolous matter being a poiſon *ſui generis*, it cannot by inoculation communicate any other diſtemper. The venereal diſeaſe is known to be as communicable as any, yet ſeveral perſons have been inoculated from patients labouring under conſiderable degrees of the venereal diſeaſe, and no ill conſequences were ever yet known to follow. Mr. Burgeſs informs us that he knew of one inſtance where the matter was inadvertently taken by a ſurgeon from a young woman, who fell ill of the ſmall-pox, after being admitted into St. Thomas's hoſpital to be ſalivated. Three patients were inoculated from this matter, and had the ſmall-pox in the moſt favourable manner. Nothing particular happened about the wounds, and the patients all grew up healthy ſubjects. See Burgeſs's "Account of the Preparation and Management neceſſary to Inoculation, 1754." Dr. Kirkpatrick alſo mentions in his "Analyſis of Inoculation," that he was aſſured by a reſpectable ſurgeon, that a young lady was inoculated by an apothecary from a gentleman's ſervant, who had a venereal bubo together with the ſmall-pox. The lady, notwithſtanding, did very well, and never had the ſlighteſt ſymptom of venereal infection. The aſſertion, then, that other diſeaſes may be communicated by inoculation remains quite unproved. That other diſeaſes may follow the ſmall-pox no man of common ſenſe will deny; for it is no ſecurity againſt them. Nay, the debility which it ſometimes induces, may even promote the acceſſion of ſcrofula, conſumption, &c.; but ſince inoculation tends ſo materially to diminiſh the ſeverity of the ſmall-pox, it muſt alſo have a great effect in leſſening and preventing any circumſtances, which are to be regarded as conſequences of ſuch ſeverity.

3. Perhaps the diſeaſe may never attack in the natural way. This objection, one would think, muſt give way to the bare ſtatement, that, previous to the practice of inoculation, the caſual ſmall-pox annually deſtroyed about two millions of lives in the Ruſſian empire alone, and committed equal devaſtation in ſeveral other parts of the world. It has been obſerved by Dr. Jurin, in an ingenious paper inſerted in the Philoſophical Tranſactions, that it is difficult to aſcertain the exact number who die without having the ſmall-pox; but that of all the children that are born, there will, ſome time or another, die of the ſmall-pox one in fourteen; and that of perſons of all ages taken ill of the ſame diſtemper, two in eleven will fall victims to it.

From a table of burials it appears that in Edinburgh and St. Cuthbert's pariſh, during ten years, about one-tenth of the dead was killed by the ſmall-pox.

It may likewiſe be noticed, that no individual is originally unſuſceptible of the ſmall-pox, and though a proportion of mankind might poſſibly eſcape the contagion, ſtill the number of victims to the diſorder caſually taken would be very conſiderable. During the controverſies concerning the advantages and diſadvantages of inoculation, enquiries were made from houſe to houſe, in ſeveral towns, in order to aſcertain the number of people, who had had the ſmall-pox in one twelvemonth, when it appeared that nearly one died in every five who had taken the diſeaſe; and that of eighty-two perſons who were inoculated in theſe places in the ſame year, not one died.

Dr. Nettleton, Dr. Whitaker, and ſome others, made an attempt to find out how many perſons had had the ſmall-pox, and how many had died of it in the year 1722. The reſult was as follows:

	Sick of the Small-pox.	Died.
In ſeveral towns in Yorkſhire	3405	636
Chicheſter - -	994	168
Haverfordweſt - -	227	52
Total -	4626	856

This table will ſerve to depict the general event of the caſual ſmall-pox. The mortality was conſiderable; but it was even much greater at ſome periods, and in particular parts of the world. On the other hand, inoculation has ſometimes been purſued with ſuch remarkable ſucceſs, that out of a thouſand perſons inoculated one after the other, ſcarcely one has periſhed.

We ſhall not ſwell this article with a detail of the numerous phyſical reaſons urged againſt inoculation, the preſent ſtate of knowledge renders ſuch a taſk unneceſſary; and all the objections alluded to, have been ſo often and completely proved to be frivolous and unfounded, that of late years the practice has encountered no oppoſition, if we put out of preſent conſideration the praiſeworthy endeavours to ſubſtitute every where the vaccine for the variolous inoculation.

4. The moral and religious objections which were adduced againſt the practice of inoculation, gave riſe to as much d pute as the medical differences of opinion, and c operated ſtill more perniciouſly in prejudicing th

people againſt the art. The plan of bringing diſeaſes upon ourſelves, was repreſented as a Circaſſian impiety, altogether irreconcileable to a Chriſtian conſcience. Thoſe who adopted the practice were branded with the appellations of poiſoners and murderers, and were ſaid to be inſtigated by atheiſm, quackery, and avarice. One anonymous writer implored the interference of parliament. He obſerves, " while this helliſh principle has ſo much hold upon mankind, 'tis highly neceſſary that there ſhould be no doors left open for the practice, at leaſt none that can be ſhut; that there ſhould be no room for the covering of ſuch horrid things from the reach of the law. Phyſicians they have already too much latitude in practice, to make havoc of mankind for the ſatisfaction of their judgment in phyſic, and increaſe of their experience; but every quack now may be a hireling to the devil, and, like that banditti in Italy, be ready to do the drudgery of removing heirs, and other obſtructing incumbents of many kinds, and to do this under the maſk of a cure, inoculating death inſtead of a diſeaſe, and making uſe of an art never before practiſed, in a manner not foreſeen, and by the laws not yet ſufficiently guarded againſt." See a pamphlet entitled " The new Practice of Inoculation conſidered, and an humble Application to the approaching Parliament for the Regulation of that dangerous Experiment, 1722."

A ſermon was preached on Sunday, July 8th, 1722, againſt inoculation, at St. Andrew's church, Holborn, by the Rev. Mr. Maſſey. His text was " So went Satan forth from the preſence of the Lord, and ſmote Job with ſore boils from the ſole of his foot unto his crown," chap. ii. v. 78. In this diſcourſe, the Devil was depicted as having firſt put inoculation in practice upon Job. Inoculation was ſtigmatized as a diabolical operation, and an anti-providential project, that inſults our religion, and baniſhes providence out of the world.

It is almoſt unneceſſary for us to ſay, that Job's being afflicted with the ſmall-pox was nothing more than an unwarrantable aſſertion, and a whimſical conceit of the Rev. Divine. The following epigram on the ſubject appeared in the Monthly Miſcellany for March 1774.

> We're told, by one of the black robe,
> The Devil inoculated Job;
> Suppoſe 'tis true, what he does tell,
> Pray neighbours, *did not Job do well?*

Dr. Wagſtaffe had aſſerted, that it never came into men's heads to take the work out of nature's hands, and raiſe diſtempers by art in the human body. (See " Letter ſhewing the Danger and Uncertainty of inoculating the Small-pox.") To this Mr. Maitland replied in his Vindication, " that the practice of phyſic is founded upon the principle of curing *natural* by raiſing *artificial diſeaſes*. What is bleeding, but an artificial hemorrhagy; purging, but raiſing an artificial diarrhœa? Are not bliſters, iſſues, and ſetons, artificial impoſthumations?"

The virulence and ſarcaſm by which the oppoſers of inoculation were actuated, are well exhibited in the rejoinder, made by another writer, to the foregoing very ſenſible obſervation. " Very good, ſir, but go on,—what is correction at the cart's tail, but the noble art of muſcular phlebotomy? What is burning in the hand, but the art of applying a cauſtic? What is hanging but an artificial quinzy, which makes the patient feel for the ground, and chokes him? What is breaking on the wheel, but the art of making diſlocations and fractures, and differs from the wounds and amputations of ſurgeons only by the manner and intention? —A Short and Plain Account of Inoculation, &c. by I. Maſſey.

Dr. Maddox, biſhop of Worceſter, was an able and zealous friend to the cauſe of inoculation, and preached an excellent ſermon in ſupport of the practice. He obſerved, that it was needleſs to enter into a diſquiſition, which is the moſt proper method of deſignedly raiſing the ſmall-pox in the human frame, by carrying the perſon that is to receive it to the contagious ſteams, or effluvia; or bringing to him the infected matter. Religious difficulties (if any ſtill remain, concerning a practice that has preſerved ſo many lives, and prevented the heavieſt grief in ſo many families,) are exactly the ſame, in either method of voluntary communication.

For it is no more invading the prerogative of heaven to occaſion one eaſy and voluntary conveyance of the infection than another, by a ſlight and hardly ſenſible raſure upon the arm, than communicating the ſame diſtemper, by inviſible particles, to that tender organ the lungs, which are ſo frequently affected by the venom of this diſeaſe, when contracted by the breath, or receiving into the body infected particles in what is called the natural way.

Were this preventive method (continues the learned prelate) univerſally ſucceſsful, and never once to fail in any inſtance whatſoever, it is ſcarcely to be preſumed that any objection would be raiſed againſt a ſalutary expedient, to preſerve from deſtruction ſo great a part of the human ſpecies as daily fall by this mortal enemy, when it attacks men as it were in the dark, ignorant of, and unprepared for the aſſault.

This method of inoculation would then be no more liable to cenſure than the making a voluntary wound, by inciſion, to form a neceſſary drain; or adminiſtering any operative medicine, which, upon repeated trials, had proved an unfailing ſecurity againſt any other dangerous and prevailing peſtilence or contagion.

But, in order to excite and ſecure a dependence upon his divine providence, the great Governor of the world has appointed that no human affairs, not even our neceſſary ſuſtenance, ſhould be attended with ſuch abſolute certainty: a very wiſe appointment, that vain man might not fancy himſelf an independent being; but, among all the changes and chances of this mortal life, ſhould ſtill look up unto, becauſe he can only be defended by, God's moſt gracious and ready help.

Experience alone muſt determine the good or bad conſequences of this artificial infection, as it ought to do in all other medical attempts, which, in many inſtances, are, in reality, little more than curing or alleviating one diſtemper, by exciting or introducing another. And, in this view, the method now under conſideration, of leſſening the hazard of a very mortal diſeaſe, ſhould be conſidered in the ſame light as every other antidote, or preventive attempt in phyſic or ſurgery, againſt any probable, almoſt certain malady, internal or external.

The philanthropic prelate forebore to derive any ſtrength to the argument, from the great number of noble, venerable, and worthy perſons, of every rank and profeſſion, who were in his time the public advocates of this compaſſionate deſign: he wiſhed to ſtand upon its own proper evidence and foundation.

He remarked, that a ſafe paſſage through this diſtemper, like the emancipating ſlaves, is a deliverance to vaſt numbers of people kept, as it were, in bondage; who, before they have undergone this abhorred diſeaſe, are excluded from many offices in life, and prevented from purſuing their neceſſary buſineſs; and it gives tranquillity and cheerfulneſs to to perſons of better condition, who, under apprehenſion of this loathſome and infectious diſorder, were all their former days ſubject to great anxiety and conſtant fear.

The biſhop commented with great ability upon the advantage that inoculation affords of communicating the ſmall-pox at the moſt favourable time of life, *viz.* infancy, when the diſeaſe is moſt inclined to put on a mild form. He mentioned, authentically, that, out of 1500 perſons inoculated by Mr. ſerjeant Ranby, Mr. ſerjeant Hawkins, and Mr. Middleton, only three died.

He ſtated to his congregation, that, from the annual account within the bills of mortality, (in which many places in and near the city were omitted,) it appeared that, in twenty years, *viz.* from the year 1731 to the year 1750, incluſive, no leſs than 39,115 perſons died of this fatal diſtemper; which, including the places not inſerted in the weekly bills, muſt have been conſiderably more than 2000 every year, that fell in the two adjoining cities and parts adjacent. And, he noticed, that if only one in ſeven is ſuppoſed to die by the diſtemper taken in the natural way, then the whole number of perſons who, in this period of twenty years, were thus infected, muſt have amounted to 280,000, of which number no leſs than 40,000 periſhed. But if one in every 200 ſhould be ſuppoſed to die under inoculation, which is really more than fall by that artificial infection, inſtead of 40,000, only 1400 would have died in one diſtrict in twenty years, had inoculation been univerſally adopted. Thus the difference in that ſhort period, in one ſpot, would have been no leſs than 38,600 lives preſerved, beſides the numerous poſterity that might have been derived from them.

The learned divine inſiſted, that humanity, regard to our country, the dictates of reaſon, and the precepts of religion, are all in favour of the ſyſtem of inoculation.

During the oppoſition to the introduction of inoculation, many affected to be actuated againſt it by religious ſcruples, and the practice was alleged to be unlawful.

In anſwer to this, the ſcriptures aſk, Is it lawful to ſave life, or to deſtroy it? Luke, vi. 9. We ſhould alſo remember, that, as the fall of man brought the danger of diſeaſes into the world, ſo to evade, oppoſe, or deſtroy it, is not only his right, but duty, if in his power. When danger ſurrounds us, no conduct is more proper than to inquire into, and purſue the means of eſcape. To neglect our ſafety is to ſink below brutes, which are taught by inſtinct to ſhun the evil to which they are expoſed. Inoculation is certainly in many inſtances a means of ſaving life, and of moderating the ſeverity of affliction. And, in a moral point of view, wilfully neglecting the means of preſerving life muſt appear almoſt as bad as the guilt of murder.

The bringing of a diſtemper on ourſelves was likewiſe repreſented by bigotted individuals as uſurping the ſacred prerogative of God.

As to the firſt part of this objection, if by diſtempers are meant ſickneſs and pain, the ſame thing is practiſed daily in other inſtances, in concurrence with the ſcripture dictate, *viz.* of two evils chooſe the leaſt. Inoculation is not done from a mere wanton deſire of imparting any diſeaſe, but is performed in order that the patient may go through an unavoidable diſtemper with the leaſt difficulty, and the greateſt chance of recovery. The natural ſmall-pox being highly perilous, it muſt be a great deſideratum to avoid it, and inoculation enables us to do ſo, by deſtroying that diſpoſition in the body, without which the diſeaſe cannot take place.

Reſpecting the offence given to God, a reliance on providence does not imply that we are not to prevent or oppoſe the evils which we foreſee, and which we have it in our power to guard againſt by prudent precautions. Would theſe objectors, in other inſtances, refuſe the means of leſſening the malignancy and danger of diſeaſe, than which the practice of inoculation is no more? Let the aſſertors of the rights of God ſay, whether, when God permits the diſcovery of preſerving ourſelves, he forbids our uſing it? If our Maker offers us a remedy, it is offending him to reject it.

It was moreover objected, that the decrees of God have fixed the commiſſion of every diſeaſe, and that our precaution cannot prevent what He has determined.

To this it was anſwered, that, however true it is, our days are determined, &c. yet it is God's revealed will, and not his ſecret purpoſes, which we are to regard as the rule of duty. God has required of us to have a tender regard of our lives; and they who diſobey him therein are guilty of a degree of ſelf-murder, and will never be acquitted of that guilt by the ſecret determination of Heaven concerning them. Beſides, God, who has ordained the end, has alſo determined the means leading to it. St. Paul, in his dangerous voyage, had a ſpecial revelation to aſſure him, that all who were with him ſhould eſcape; and yet, when the ſeamen were getting out of the ſhip, he declares, that if they did not ſtay in it they could not be ſaved. Acts, xxvii. 31. God purpoſed to preſerve them in the way whereby they were afterwards delivered.

It was likewiſe contended that we ought not to do evil, that good may come.

On the other hand, it was acknowledged, that if inoculation is, in its own nature, a moral evil, it certainly ſhould be rejected, however great its advantages may ſeem to be. The proſpect of relief from any calamity in life ſhould not tempt us to offend God. But they who make the foregoing objection proceed upon a miſtake. Their principle is true with regard to moral evil, but is not ſo when applied to phyſical. It is certainly lawful to pull down one houſe to ſave a great number from being burnt. This is a phyſical evil, which can hardly take place without ſome degree of moral evil; and many other inſtances may be pointed out, where, for a greater good, a leſſer ill is ſubmitted to.

It was further objected, that the patient might die, and then his laſt moments would be diſtreſſed, and the future reflections of his friends grievous.

This objection led many to decline the practice of inoculation, even while they allowed the theory of it to be reaſonable. They entertained hopes of eſcaping the diſtemper in the natural way, and they had fears of dying in this, and thus they were prevented from undergoing the diſorder. But they ſhould have conſidered what grounds they had for either their hopes or fears, and what was to be advanced to balance the account, in an examination of the different degrees of probability attendant on what they hoped for, and what they were afraid of, in the neglect or adoption of inoculation. Dying is an awful thing; but if inoculation was a *probable and lawful* means of preſerving life in a time of danger, it was a duty to comply with it; and what reflection could be more peaceful than that of dying in the way of duty?

It was further objected by the religious oppoſers of the new practice, that fear was a dangerous paſſion in the ſmall-pox, and that inoculation increaſed the cauſes of fear, by leſſening our faith and truſt in God.

When the ſmall-pox was left to nature, ſuch were its ravages, that, not to fear, would have been to ſink beneath humanity: its conſequences were too grievous to be viewed with indifference. Experience manifeſted the advantages and general ſafety of receiving the diſeaſe by inoculation, and ſo far the practice was a remedy to that juſt alarm which enhanced the danger, when the diſtemper was left to itſelf. As to faith in God, none was deſirable, except that which was agreeable to the ſcripture, and which could never have the effect of creating a diſregard to calamities and danger. Inoculation was well proved to be a means of ſafety, and it would have been as rational to conclude that our lives could be preſerved without eating and drinking, as that we ſhould be delivered from danger without a prudent care for our own ſafety. We are to depend on the care of providence only in the way of duty. To boaſt of courage and truſt in God, while we omit the means of eſcaping danger which ſurrounds us, is not faith but preſumption.

Thus, when inoculation became a probable means by which life might be ſaved, the neglect of it, ſo far from being truſt, was preſumption.

We ſhall now take our leave of theſe theological diſputes and ſcruples, which have now been long removed by the influence of right reaſon and ſound ſenſe. When it was once well aſcertained and univerſally believed that inoculation was really a means of preſerving life, the idea of its being criminal to adopt the practice could not have much duration. A very able diſcuſſion of moſt of the foregoing objections was publiſhed in a pamphlet, entitled "Inoculation impartially conſidered, and proved to be conſiſtent with Reaſon and Revelation," by the Rev. David Some, edited by Dr. Doddridge, 1750.

Of Inoculation, as practiſed by the Suttons, Baron Dimſdale, &c.—The introduction of the Suttonian practice was regarded quite as a new era in the hiſtory of inoculation, from the novelty of the method, and its unparalleled ſucceſs.

Mr. Robert Sutton, the firſt of this name, who acquired celebrity as an inoculator, reſided at Debenham in Suffolk, where he practiſed ſurgery and pharmacy. From the year 1757 to 1767, he inoculated 2514 perſons.

Two of his ſons, Robert and Daniel, followed the medical profeſſion, and after aſſiſting him during the three firſt years of his practice of inoculation, Robert eſtabliſhed himſelf as an inoculator at Bury St. Edmund's, while Daniel became aſſiſtant to Mr. Bumſtead, a ſurgeon at Oxford. Daniel, on his return to Debenham, in the year 1763, ſuggeſted to his father a new plan of inoculation, in which he propoſed to ſhorten the time of preparation to a few days, and not to confine the inoculated patients to the houſe, but to oblige them to be in the open air as much as poſſible during the whole progreſs of the diſtemper.

The father condemned this ſcheme as raſh and dangerous. Its advantages, however, ſoon becoming manifeſt to patients, they evinced a deſire of being ſolely under the management of Mr. D. Sutton. The conſequence was, that the father and ſon ſeparated about the end of the year 1763, when the latter opened an inoculating-houſe near Ingateſtone, in Eſſex. Here, by public advertiſements, he made known his plan of inoculating in an improved way peculiar to himſelf. The encouragement which he met with may be eſtimated from his receiving, during the firſt year, 2000 guineas, and above 6000 the ſecond. His fame ſpread to the moſt diſtant parts of the kingdom; and the numbers that reſorted to him for inoculation, conſtantly filled the village of Ingateſtone, ſo that accommodations could hardly be procured for the purpoſe. His practice in Kent being alſo very extenſive, he was obliged to employ ſeveral medical aſſiſtants. In 1767, Mr. D. Sutton removed to London, in hopes of reaping ſtill more emolument; but his receipt fell far ſhort of his expectation.

According to Mr. Houlton's ſtatement, the number of perſons inoculated by Mr. Daniel Sutton in the year

1764 was 1629
1765 — 4347
1766 — 7816

13,792

"To the above number," ſays he, "ſhould be added 6000 that have been inoculated by Mr. Sutton's aſſiſtants; ſo that he may be ſaid to have inoculated, within theſe three years, 20,000 perſons."

Of this number, not one was allowed to have fairly died of inoculation. The venal pen of the preceding writer certainly exaggerated every thing, and great boaſt was alſo falſely made of the Suttons having a ſpecific medicine for preventing too many puſtules. However, no doubt was entertained that the Suttonian practice was incomparably more ſucceſsful than any other.

Medical practitioners, ſtruck with the advantages of the new treatment, ſet about the inveſtigation of the cauſes. Sir George Baker publiſhed the following account of the manner in which Mr. D. Sutton practiſed inoculation: "All perſons are obliged to go through a ſtrict preparatory regimen for a fortnight before the operation is performed. During this courſe, every kind of animal food, milk only excepted, and all fermented liquors and ſpices are forbidden. Fruit of all ſorts is allowed, except only on thoſe days when a purging medicine is taken. In this fortnight of preparation, a doſe of a powder is ordered to be taken at bed-time, three ſeveral times; and on the following morning a doſe of purging ſalt. To children, only three doſes of the powder are given, without any purging ſalt. The compoſition of this powder is induſtriouſly kept a ſecret. But, that it conſiſts partly of a mercurial preparation, is demonſtrated by its having made the gums of ſeveral people ſore, and even ſalivated others. The months of May, June, July, and Auguſt, are preferred as the moſt ſeaſonable for inoculation. But healthy people are inoculated at any ſeaſon of the year indifferently. The autumn is held to be the worſt ſeaſon; and an aguiſh habit the leaſt proper for this operation. No objection is made to any one on account of what is vulgarly called a ſcorbutic habit of body, or bad blood. The perſon who is to be inoculated, on his arrival at the houſe uſed for this purpoſe, is carried into a public room, where, very probably, he may meet a large company aſſembled under the ſeveral ſtages of the ſmall-pox. The operator then opens a puſtule of one of the company, chuſing one where the matter is in a crude ſtate; and then juſt raiſes up the cuticle on the outer part of the arm, where it is thickeſt, with his moiſt lancet. This done, he only preſſes down the raiſed cuticle with his finger, and applies neither plaſter nor bandage. What is extremely remarkable, he frequently inoculates people with the moiſture taken from the arm before the eruption of the ſmall-pox, nay, within four days after the operation has been performed. And," ſays ſir G. Baker, "I am informed, at preſent he gives the preference to this method. He has attempted to inoculate by means of the blood; but without ſucceſs. If the operator happeneth not to be at home when the new patient arriveth, this is looked upon as a matter of no importance. And ſo far is he from any apprehenſion of accumulating infection, that it is very common for perſons, juſt inoculated, to lie in the ſame bed with a patient under any ſtage of the diſeaſe, as it may happen; nay, ſometimes in a room where four or five people are ſick. On the night following the operation, the patient takes a pill. This medicine is repeated every other night, until the fever comes on. All this time, moderate exerciſe in the air is ſtrongly recommended. In twenty-four hours after the inoculation, the operator can often diſtinguiſh whether or no the patient be infected. He every day examines the inciſion; and from hence ſeems to prognoſticate, with ſome degree of certainty, concerning the degree of the future diſeaſe. In three days after the operation (provided that it has ſucceeded), there appears on the inciſion a ſpot like a flea-bite, not as yet above the ſkin. This ſpot, by degrees, riſes to a red pimple; and then becomes a bladder full of clear lymph. This advanceth to maturation like the variolous puſtules, but is the laſt which falleth off. In proportion as the diſcolouration round the place of the inciſion is greater, the leſs quantity of eruption is expected. And, therefore, whenever only a ſmall diſcoloured circle is obſerved, purging medicines, more than ordinary, and more frequently repeated, are held to be neceſſary.

"The preparatory diet is ſtill continued. If the fever remains ſome hours without any tendency to perſpiration, ſome acid drops are adminiſtered, the effect of which is to bring on a profuſe ſweat; but in ſome caſes where the fever is very high, a powder or pill, ſtill more powerful, is given. In general, during the burning heat of the fever, the inoculator gives cold water. But the perſpiration beginning, he orders warm balm-tea or thin water-gruel. As ſoon as the ſweat abates, the eruption having made its firſt appearance, he obliges every body to get up, to walk about the houſe, or into the garden. From this time, to the turn of the diſeaſe, he gives milk gruel, *ad libitum*.

"On the day following the firſt appearance of the opaque ſpot on the puſtules, to grown people he gives an ounce of Glauber's purging ſalt. To children he gives a doſe of it proportioned to their age. Then, if the eruption be ſmall, he allows them to eat a little boiled mutton, and toaſt and butter, and to drink ſmall beer. But in caſe of a large eruption, he gives them, on the third day after their having taken the firſt doſe, another doſe of the ſame ſalt, and confines them to the diet ordered during the preparation."

Sir George, after repreſenting this as the practice of Mr. D. Sutton, aſcribes its ſuperior ſucceſs to the free uſe of cold air. Dr. Glaſs, of Exeter, in a publication which appeared ſhortly after that of the preceding gentleman, imputed the advantages of the Suttonian method to the patient being ſweated; while another author, Mr. Chandler, differed from both the former writers, and referred the chief benefit of the plan to the infecting humour being taken in a crude ſtate, "before it has been ultimately variolated by the ſucceeding fever." Baron Dimſdale likewiſe thought, that lthough the whole proceſs might have ſome ſhare in the production of the ſucceſs, yet he believed the chief good was owing to the method of inoculating with recent fluid matter, and the management of the patients at the time of he eruption.

In November, 1766, baron Dimſdale publiſhed his well known work, entitled "The preſent Method of inoculating for the Small-pox." The inſtructions contained in this book have deſervedly continued ever ſince, almoſt without exception, to regulate the practice of inoculation.

The baron, when the age is left to his choice, avoids inoculating children under two years of age. The ſubjects conſidered by him improper for the operation, are ſuch as abour under any acute or critical diſeaſes, or their effects; nd alſo ſuch as have evident marks of corroſive acrimonious humours, or manifeſt debility.

As for the moſt eligible ſeaſon of the year, he thought, hat perſons generally had more puſtules in the ſpring than ny other time; and epidemic diſeaſes (eſpecially fluxes, intermittents, and ulcerated ſore throats) being moſt frequent in the autumn, the baron did not look upon this as in general the moſt favourable ſeaſon. But he was of opinion, that we might ſafely inoculate at all ſeaſons, provided care were taken to ſcreen the patients as much as poſſible from heat in ſummer, and to prevent them from keeping themſelves too warm, and too much ſhut up from the weather in winter. He thought it prudent, however, to avoid inoculation while any peculiar epidemic diſeaſes were prevalent. He recommended a preparatory regimen, ſo as to reduce the patient, if in high health, to a low and more ſecure ſtate; to ſtrengthen the conſtitution if too low, to correct what appears vitiated; and to clear the ſtomach and bowels as much as may be from all crudities and their effects. Young or middle aged perſons, enjoying a good ſtate of health, were ſtrictly confined to a milk and vegetable diet for nine days previous to the operation, during which period they were ordered to take the following powder three times at bed-time, and a doſe of Glauber's ſalt each ſucceeding morning. The powder was compoſed of eight grains of calomel, the ſame quantity of compound powder of crabs' claws, and $\frac{1}{6}$th of a grain of emetic tartar. For women or children the doſe was leſſened, according to their age and ſtrength. For thoſe who were of a tender delicate conſtitution, or valetudinarians, he preſcribed a milder medicine, and rather of the alterative than the purgative kind; indulging ſome with light animal food, and in caſe of lowneſs, with a glaſs or two of wine. The baron preferred the following method of inoculating. The patient to be infected being in the ſame houſe, and if no objection is made to it, in the ſame room with one who has the diſeaſe, a little variolous matter is taken from the place of inſertion, if the ſubject is under inoculation, or a puſtule, if in the natural way, on the point of a lancet, ſo that both ſides of the point are moiſtened. With this lancet an inciſion is made in that part of the arm where iſſues are uſually placed, deep enough to paſs through the ſcarf-ſkin, and juſt to touch the ſkin itſelf, and in length as ſhort as poſſible, not more than one-eighth of an inch. The little wound being then ſtretched open between the finger and thumb of the operator, the inciſion is moiſtened with the matter by gently touching it with the flat ſide of the infected lancet. The baron generally performed the operation in both arms, and ſometimes in two places in one arm, a little diſtance from each other. Neither plaſter nor bandage is to be applied to the inoculated part. The baron preferred uſing ſuch matter as was taken during the eruptive fever, it being then in his opinion endued with moſt activity. When the diſeaſe was to be communicated from an inoculated perſon, he took the matter, not from the ſecondary puſtules, but from the place of inoculation. The ſecond day after the operation, if the inoculated part is viewed with a lens, he ſays, there generally appears a kind of orange-coloured ſtain about the inciſion, and the ſurrounding ſkin ſeems to contract. At this time the baron uſed to preſcribe the following medicine to be taken at bed-time: calomel and compound powder of crabs' claws, of each three grains, emetic tartar $\frac{1}{10}$th of a grain. On the fourth or fifth day a hardneſs is perceptible to the finger. The part itches and appears ſlightly inflamed. He remarks, that a little clear fluid may be ſeen under a kind of veſication, the part reſembling a ſuperficial burn. In general, about the ſixth day ſome pain and ſtiffneſs are felt in the arm-pit. This was regarded as a very deſirable ſymptom, as foreboding the near approach of the eruptive ſymptoms, and the favourable progreſs of the diſeaſe. Sometimes on the ſeventh, more often on the eighth day, the ſymptoms of the eruptive fever appear; ſuch as ſlight remitting pains in the head and back, ſucceeded by tranſient ſhiverings and alternate heats, which continue in a greater or leſſer degree till the eruption is perfected.

The inflammation in the arm at this time ſpreads faſt, and upon viewing the inciſion with a good glaſs, it appears for the moſt part ſurrounded with an infinite number of ſmall puſtules, which increaſe in ſize and extent as the diſeaſe advances. On the tenth or eleventh day a circular or oval effloreſcence is uſually diſcovered ſurrounding the inciſion, and extending ſometimes nearly half round the arm, but more frequently to about the ſize of a ſhilling, and, being under the cuticle, is ſmooth and not painful. This effloreſcence was alſo regarded as favourable; it accompanies the eruption, every diſagreeable ſymptom ceaſes, and the pain and ſtiffneſs in the axilla go off.

When the eruptive ſymptoms came on with more ſeverity, baron Dimſdale uſed to direct a repetition of the laſt-mentioned powder, and on the following morning three or four ſtools were procured by a laxative draught.

The baron notices that ſometimes the ſtate of the inciſion is ſuch for ſeveral days, that the effects of the inoculation can barely be perceived, the colour about the wound remaining pale inſtead of changing to red; the edges of the inciſion ſpread but little, they remain flat, and are attended neither with itching nor uneaſineſs of any kind. Nay, ſometimes on the fifth, and even on the ſixth day, the alteration is ſo little, as to make it doubtful whether the infection has taken place. Dimſdale ſets down ſuch appearances as unfavourable, and implying a late and more untoward diſeaſe. To prevent this, he uſed to direct the powder or pill to be taken each night, and in caſe it failed to operate by ſtool, or there was the leaſt diſpoſition to coſtiveneſs, an ounce of Glauber's ſauce, or a laxative draught, was given in the morning, once or twice, as the caſe might require. The baron believed that theſe meaſures forwarded the inflammation, which he always wiſhed to ſee, as he had conſtantly obſerved, that an early progreſs on the arm, and an early commencement of the eruptive complaints, portended that the diſtemper would be mild and favourable; and on the contrary, that when both were late, the ſymptoms proved more irregular and untoward. The patient, inſtead of being confined to his bed or room, when the ſymptoms of the eruptive fever came on, was directed, as ſoon as the purging medicine had operated, to keep abroad in the open air, be it ever ſo cold, as much as he could bear, and to drink cold water, if thirſty, always taking care not to ſtand ſtill while abroad, but to walk about with moderation.

In certain caſes, notwithſtanding baron Dimſdale found the eruptive ſymptoms extremely violent, and the patients almoſt incapable of motion, and apprehenſive of cold as the greateſt evil, yet he perſuaded them to riſe out of bed and go out of doors, often ſupported by aſſiſtants, and he allowed them to drink as much cold water as they choſe. No ſiniſter accident was the conſequence, but, on the contrary, the patients' ſpirits were revived, and every ſymptom ſeemed benefited by the method.

When any uncommon languor happened, a baſin of thin broth, or a glaſs of wine, was allowed in the day, or ſome white-wine whey at bed-time. Indeed, ſuch things were allowed at any time to tender, aged, or weakly perſons. After the eruption was completed, if occaſion required, they were indulged in a little well-boiled meat of the lighteſt kind, as chicken, veal, or mutton.

The practice of baron Dimſdale was certainly, in a great meaſure, an imitation of the method purſued by Mr. D. Sutton.

We ſhall conclude this article with a few neceſſary inſtructions and references.

1. The age of the perſon to be inoculated for the ſmall-pox ſhould be as little advanced as poſſible; but (if it can be avoided) not leſs than four months.

2. The matter, when convenient, ſhould be taken from a young ſubject who has the ſmall-pox in a favourable way, and freſh matter ſhould have the preference to ſuch as is old. It deſerves particular attention, however, that it is chiefly for the ſake of avoiding unprofeſſional blame that we chooſe matter from patients labouring under the diſeaſe mildly, ſince experience rather proves, that the lenity or malignity of the ſmall-pox depends very little on whether the matter is taken from one patient who has the diſtemper favourably, or from another who has it ſeverely. Nor can we wonder at this fact, ſince the contagion can only be of one ſort. Therefore, were a patient much expoſed to the caſual ſmall-pox, and no matter could be procured from any ſubject that had the diſtemper mildly, the ſurgeon ſhould recommend inoculation with ſuch matter as it would be in his power to obtain.

3. In inoculating, the operator is to make the ſlighteſt puncture, or ſcratch, imaginable in the arm over the place where the inſertion of the deltoid muſcle terminates. That part of the lancet which is beſmeared with the matter, is to be repeatedly rubbed over the wound, and leſt the matter be wiped away, it is beſt not to pull down the ſhirt-ſleeve till the part is quite dry. Some operators prefer introducing the lancet, armed with the matter, obliquely beneath the cuticle. When this mode is followed, it is proper at the time of withdrawing the lancet to preſs the wound with the finger, ſo that the parts in contact with the matter may wipe it off the lancet with more certainty.

The works on the inoculation for the ſmall-pox are too numerous to be even mentioned: we would, however, particularly refer to Friend's Hiſtory of Medicine. D'Entrecolle's Lettres Edifiantes et Curieuſes. Avicennæ Opera. Mémoires ſur l'Inoculation par M. de la Condamine. Philoſophical Tranſactions for 1722. Monro on Inoculation in Scotland. Holwell's Account of the Manner of inoculating in the Eaſt Indies. Maitland's Account of inoculating the Small-pox. Mead de Variolis et Morbillis. Kirkpatrick's Analyſis of Inoculation. Some's Small-pox impartially conſidered, &c. Murray's Hiſt. Inſitionis Variolarum in Suecia. Dimſdale's preſent Method of inoculating for the Small-pox. Jurin's Account of the Succeſs of inoculating the Small-pox in 1721, &c. and his letter to Dr. Coteſworth. Woodville's Hiſtory of the Small-pox, &c.

For an account of the inoculation for the cow-pox, now ſo deſervedly preferred to the preceding practice, ſee COW-POX and VACCINATION.

A particular deſcription of the SMALL-POX will be found under that word.

INOCULATION, *Hoſpital for.* See HOSPITAL.

INOFFICIOUS TESTAMENT, in *Law.* See TESTAMENT.

INOM BARLEY, in *Agriculture*, a term applied to ſuch barley as is ſown the ſecond crop after the ground has been fallowed, or cleaned from weeds.

INORDINATE PROPORTION, is where three magnitudes being in one rank and three others proportional to them in another, you compare them in a different order.

E. gr. If there be in one rank theſe three numbers, 2, 3, 9; and in another rank, theſe other three, 8, 24, 36, which are proportional to the precedent, in a different order; ſo that 2 be to 3 as 24 to 36, and 3 to 9 as 8 to 24; then caſting

ing away the mean terms in each rank, you conclude the firſt 2 in the firſt rank to be to the laſt, 9; as 8, the firſt of the other rank, to the laſt, 36.

INORGANIC, in *Natural Hiſtory*, or unorganized bodies, are mineral ſubſtances which are not organized or conſtructed as animals and vegetables capable of life are; ſuch are alſo called native foſſils, to diſtinguiſh them from organic remains or reliquia. Martin's "Outlines," p. 1.

INOSARCION, a name given by the old Greek and Roman authors to a peculiar ſpecies of emerald, called alſo by ſome the Chalcedonian emerald. The great diſtinction of this from all the other kinds of this gem, was its not being of the pure, clear, and unvarying colours of the others, but having thick veins in it, which gave peculiar refractions and reflections to the light; and though the ſtone was in itſelf wholly green, yet when viewed in ſide lights, theſe veins gave all thoſe changeable colours that ornament the feathers of a peacock's tail, or the neck of a pigeon.

INOSCULATION. See Anastomasis and Artery.

INOWLOCZ, in *Geography*, a town of the duchy of Warſaw; 56 miles S.E. of Lenczicz.

INOWLOCZAW, or Jungenleslaw, a town of the duchy of Warſaw; 26 miles W. of Wladiſlaw.

INOWSAL, a ſmall iſland near the northern coaſt of the iſland of Borneo. N. lat. 6° 45′. E. long. 117° 27′.

IN PACE, a Latin term, uſed among monks, to ſignify a priſon, where ſuch of them are ſhut up as have committed any grievous fault.

Formerly there uſed to be a great deal of ceremony at the putting a religious *in pace*; but now it is not much regarded. Such as are ſhut up in perpetual impriſonment, are alſo ſaid to be *in pace*.

Sometimes, alſo, the words *requieſcat in pace* are uſed by way of alluſion to a cuſtom in the Romiſh church, or praying that the ſoul of the defunct may reſt in peace.

The ſame words are alſo frequently ſeen at the bottom of epitaphs, in lieu of thoſe uſed by the ancient Romans, S. T. T. L. *i. e.* "Sit tibi terra levis, Light lie the earth;" or, "Sit humus cineri non oneroſa tuo."

IN PALE. See Pale.

INPROMPTU, or Impromptu, a Latin word frequently uſed among the French, and ſometimes in Engliſh, to ſignify a piece made off-hand, or extempore, without any previous meditation, by the mere force and vivacity of imagination.

INQUEST, or Enquest. See Enquest, Arrest, Jury.

Inquest *of Office*. See Office.

INQUIRENDO, an authority given a perſon or perſons, to inquire into ſomething for the king's advantage.

Inquirendo *Idiota*. See Idiota.

INQUIRENDUM, Ad. See Ad Inquirendum.

Inquirendum, *Melius*. See Melius, &c.

INQUISITIO *Poſt Mortem*. See *Inqueſt of* Office.

INQUISITION, in the *Civil* and *Canon Law*, a manner of proceeding for the diſcovery of ſome crime by the ſole office of the judge, in the way of ſearch or examination.

Inquisition is alſo uſed, in *Common Law*, for a like proceſs in the king's behalf, for diſcovery of lands, profits, and the like. In which ſenſe it is alſo confounded with *Office*; which ſee.

Inquisition, or the *Holy Office*, denotes an eccleſiaſtical juriſdiction eſtabliſhed in Spain, Portugal, Italy, &c. for the trial and examination of ſuch perſons as are ſuſpected to entertain any religious opinions contrary to thoſe profeſſed in the church of Rome.

It is called inquiſition, becauſe the judges by their office take cognizance of crimes on common report, without any legal evidence, except what they themſelves are able to explore.

Some people fancy they ſee the original of the inquiſition, in a conſtitution made by pope Lucius, at the council of Verona, in 1184, where he orders the biſhops to get information, either by themſelves, or by their commiſſaries, of all ſuch perſons as were ſuſpected of hereſy; and diſtinguiſhes the ſeveral degrees of ſuſpected, convicted, penitent, relapſed, &c. However this be, it is generally allowed, that pope Innocent III. laid the firſt foundation of the Holy Office; and that the Vaudois, and Albigenſes were the firſt objects of it. That pontiff, in the beginning of the thirteenth century, ſent Rainier, a Ciſtercian monk, and Pierre de Caſtelnau, archdeacon of Maguelonne, to the country of Thouloufe, or Narbonne Gaul, in order to blow up a ſpirit of zeal and perſecution againſt the prelates and princes. Theſe miſſionaries were ſoon followed by others, among whom was the famous Spaniard, Dominic, founder of the order of Preachers, who returning from Rome in the year 1206, fell in with theſe delegates, embarked in their cauſe, and laboured, both by his exhortations and conduct, in the extirpation of hereſy. Theſe ſpiritual champions were to give an account to the pope of the number of heretics in thoſe parts, and of the behaviour of the princes and perſons in authority to them; and thence they acquired the name of inquiſitors: but theſe original inquiſitors had not any court, or any authority, they were only a kind of ſpiritual ſpies, who were to make report of their diſcoveries to the pope, and to excite the Catholic princes and people to extirpate heretics.

It has been generally ſaid, that the tribunal of the inquiſition was the invention of St. Dominic, and firſt erected by him in the city of Thoulouſe; that, conſequently, he was the firſt inquiſitor; and that, although the year of its inſtitution is uncertain, it was undoubtedly confirmed, in a ſolemn manner, by Innocent III. in the council of the Lateran, in the year 1215. See Limborch's Hiſt. of the Inquiſition, by Chandler, book i. chap. 10.

This account is conteſted by Moſheim, who maintains, that St. Dominic was not appointed by the Roman pontiff to proceed judicially againſt heretics, and ſuch as were ſuſpected of hereſy, to pronounce ſentence according to their reſpective caſes, and to deliver over to the ſecular arm ſuch as perſiſted obſtinately in their errors, and therefore, in this ſenſe, was no inquiſitor; though, according to the original meaning of the term, he was inveſted with the commiſſion and authority of the Roman pontiff to extirpate hereſy, and oppoſe its abettors, but without any judicial power: nay, it is farther urged, that the court of inquiſition was not erected during the life of St. Dominic. The horrid war, which was excited by Innocent III. againſt the Albigenſes in Narbonne Gaul, and which was carried on by the croſs-bearers with the utmoſt cruelty from the year 1209 to 1229, when a treaty of peace took place between Raymond VIII. earl of Thoulouſe, and Lewis VIII. king of France, which gave a mortal blow to the cauſe of hereſy, prepared the way for the full eſtabliſhment of the inquiſition.

Inquiſitors of the firſt kind had, in the courſe of this time, been placed in almoſt every city, whoſe inhabitants had the misfortune to be ſuſpected of hereſy, notwithſtanding the reluctance which the people manifeſted to this new inſtitution, and the violence with which they frequently expelled and ſometimes maſſacred theſe bloody officers of the popiſh hierarchy. At length, the council held at Thoulouſe, in the year 1229, by Romanus, cardinal of St. Angelo, and pope's legate, went ſtill farther, and erected in every city a council of inquiſitors, conſiſting of one prieſt, and three laymen. This inſtitution was, however, ſuperſeded in the year 1233, by Gregory IX. who entruſted the Dominicans, or Preaching Friars, with the important commiſſion of diſcovering and bringing to judgment the heretics that were lurking in France; and in a formal epiſtle diſcharged the biſhops of that painful office. Immediately after this, the biſhop of Tournay, who was the pope's legate in France, began to execute this new reſolution, by appointing Pierre Cellan and Guillaume Arnaud, inquiſitors of heretical pravity at Thoulouſe; and afterwards proceeded in every city where the Dominicans had a convent, to conſtitute officers of the ſame kind choſen from among the monks of that order. From this period we are to date the commencement of the dreadful tribunal of the inquiſition, which in this and the following ages ſubdued ſuch a prodigious multitude of heretics, part of whom were converted to the church by terror, and the reſt committed to the flames without mercy. For the Dominicans erected firſt at Thoulouſe, and afterwards at Carcaſſone, and other places, a tremendous court, before which were ſummoned not only heretics, and perſons ſuſpected of hereſy; but likewiſe all who were accuſed of magic, ſorcery, Judaiſm, witchcraft, and other crimes of that kind. This tribunal, in proceſs of time, was erected in the other countries of Europe, though not every where with the ſame ſucceſs. The method of proceeding in this court of inquiſition was at firſt ſimple, and almoſt in every reſpect ſimilar to that which was obſerved in the ordinary courts of juſtice. But the Dominicans modelled it after that of the tribunal, called in the Roman church the tribunal of peace; and hence aroſe that ſtrange ſyſtem of inquiſitorial law, which in many reſpects is ſo contrary to the common feelings of humanity, and the plaineſt dictates of equity and juſtice. And that nothing might be wanting to render the ſpiritual court formidable and tremendous, the Roman pontiffs perſuaded the European princes, particularly the emperor Frederic II. and Lewis IX. king of France, not only to enact the moſt barbarous laws againſt heretics, and to commit to the flames thoſe who were pronounced ſuch by the inquiſitors, but alſo to maintain the inquiſitors in their office, and grant them their protection in the moſt open and ſolemn manner. The edicts iſſued to this purpoſe by Frederic II. are well known; edicts every way proper to excite horror, and which rendered the moſt illuſtrious piety and virtue incapable of ſaving from the moſt cruel death ſuch as had the misfortune to be diſagreeable to the inquiſitors. The laws of Frederic, in relation to the inquiſitors, may be ſeen in Limborch's Hiſtory of the Inquiſition, book i. chap. 12.

The edict of St. Lewis, in favour of theſe ghoſtly judges, iſſued out in the year 1229, is generally known under the title of *Cupientes.*

After the death of Frederic, who had long before repented the power he had given the churchmen, as having ſeen ſome of the fruits of it, pope Innocent IV. erected a perpetual tribunal of inquiſitors, and deprived the biſhops and ſecular judges of the little power the emperor Frederic had left them. And this juriſdiction, which depended immediately upon himſelf, he took care to introduce into moſt of the ſtates of Europe. In 1251 it was eſtabliſhed in Italy; in 1255 Alexander IV. appointed inquiſitors in France, at the requeſt of St. Lewis. But the inquiſitors were ſo fiery hot, and made ſuch horrible butchery among the reputed heretics, that they raiſed an univerſal deteſtation even in ſome Catholic countries themſelves. Hence it was that their reign proved very ſhort both in France and Germany; though they were occaſionally exerting themſelves; and their power was eſtabliſhed in many parts of France and Germany about the time of the Reformation by Luther; but afterwards gradually declined. Nor was even Spain entirely ſubject to them till the time of Ferdinand and Iſabella, when their power was increaſed, under pretence of clearing the country of Judaiſm and Mahometaniſm.

The inquiſition was firſt introduced into Spain in the year 1478; but the firſt inquiſitor-general, and the ſupreme council of the inquiſition, were not fixed till the year 1483. This tribunal is ariſen to ſuch a height in Spain that the king of Caſtile before his coronation ſubjects himſelf and all his dominions, by a ſpecial oath, to the moſt holy tribunal of the inquiſition. It is under the direction of an inquiſitor-general, appointed by the king, and confirmed by the pope; and this inquiſition has power to name particular inquiſitors in every place where there is any tribunal of the inquiſition.

The inquiſition was eſtabliſhed in Portugal, at the preſſing ſolicitation of king John III. about the year 1536: and both the Spaniards and Portugueſe have eſtabliſhed it in their territories in the weſtern continent.

The power of the inquiſition was very much limited in ſome countries, particularly at Venice, where it was introduced about the year 1289, and where it was received under ſuch modifications, as proved a great check on its authority; the office conſiſting of ſecular and eccleſiaſtical perſons, though the latter had been long endeavouring to bring it into their own hands, but could never prevail with the Venetian ſenate to agree to it. Indeed at Venice it ſeemed rather a political than a religious contrivance; and ſerved rather for the ſecurity of the ſtate, than that of the church. There are appeals from the ſubaltern inquiſitions in Italy, to the congregation of the holy office reſiding at Rome.

The congregation was firſt formed by Paul III. in 1542, but finally eſtabliſhed by Sixtus V. in 1588. The members of it, called ſupreme inquiſitors, aſſemble thrice in the week, and every Thurſday in the preſence of the pope, who preſides in it.

The officers or miniſters of the inquiſition are the inquiſitors, who derive their power from the pope, either by word of mouth, or by his apoſtolic letters, and can be removed only by him, or by authority conferred by him on thoſe cardinals who are the inquiſitors-general; vicars-general, who manage the affairs of the inquiſition during the abſence of the inquiſitors; aſſeſſors and counſellors, who give their advice in points of theology and law; the promoter fiſcal, whoſe office it is to examine the depoſitions of the witneſſes, to give information of criminals to the inquiſitors, and to demand their apprehenſion and impriſonment, and, finally, when apprehended and admoniſhed, to accuſe them; notaries or regiſters, who write down the injunctions, accuſations, and all the pleadings of the cauſes; the judge and receiver of the confiſcated effects; the executor and officials, who apprehend and keep in cuſtody criminals; the attendants or familiars; the croſs-bearers; and the viſitors, who viſit all the provinces of the inquiſitors, and report to the inquiſitor-general and council whatever was proper to be amended. The civil magiſtrate is entirely excluded from the cognizance of hereſy; but the inquiſitors require their aſſiſtance for the puniſhment of heretics, in conſequence of the ſentence which they pronounce: and they are ſeverely threatened with the moſt grievous puniſhments, if they neglect their duty. The puniſhments inflicted by the inquiſition on heretics are eccleſiaſtical and civil: the eccleſiaſtical or canonical are excommunication, deprivation of eccleſiaſtical burial, dignities, benefices, and offices. The civil are confiſcation of goods, which is inflicted on all who are convicted of hereſy, or confeſs, whether they repent or perſiſt in their hereſy, becauſe they are declared to incur the puniſhment, *ipſo jure*, as ſoon as they fall into hereſy; diſinheriting the children, inſomuch that though they are Catholics, they can never inherit the eſtates of their fathers who died in hereſy; infamy, which excludes from all public offices, from bearing witneſs, making wills, &c. loſs of all dominion, natural or civil, as power of parents over children, maſters over ſervants, magiſtrates and princes over ſubjects, &c. and the deprivation of all property in every thing they have; impriſonment; bann, which is a kind of ſentence of excommunication, by which any perſon is caſt out of the commonwealth, ſo that he cannot enjoy the public protection, or diſcharge any public offices, or receive any benefit of law; diffidation, which declares heretics to be enemies of their own country and of the empire, ſo that any perſon, by his own private authority, may ſeize, plunder, and kill him, as an enemy and robber, even though he be a clergyman; nor is it lawful for any one to undertake their defence when apprehended; and thoſe advocates who favour and plead for them, are pronounced infamous, and ſuſpended from their office; and finally death, which is that of being burnt alive, in ſome caſes heightened by being gagged with an iron inſtrument, ſo that in the midſt of their torments they can utter only an inarticulate ſound.

It is the conſtant practice of the inquiſition to affect, in all their procedures, to inſpire as much terror and amazement as poſſible; every thing is done with the profoundeſt ſilence and ſecrecy, and with the greateſt rigour and pretended impartiality. When a perſon is ſeized, all the world abandons him; not the neareſt friend dares to ſpeak a word in his defence; that alone would be enough to render them ſuſpected of hereſy, and would bring them within the claws of the inquiſition; nay, the neareſt relations are bribed and conſtrained to accuſe one another. The criminals are ſeized, examined, tried, tortured, and, unleſs they recant, are even condemned and executed, without ever ſeeing or knowing their accuſers; whence the revengeful have a fair occaſion of wreaking their malice on their enemies. By the forms of the inquiſition, a perſon defamed only for hereſy is obliged to make a canonical purgation, *i. e.* to purge himſelf with ſeven, more or leſs, compurgators; ſo that if he fails in one, two, or three, he is accounted guilty: beſides, every one, though excluded by other courts, is admitted as a witneſs, a mortal enemy only excepted. The names of the witneſſes are not ſhewn to the priſoner; nor is any circumſtance diſcovered, by which he can obtain the knowledge of them. If two unexceptionable witneſſes teſtify of different facts; yea, ſometimes if there be only one, or a mere report, it is thought ſufficient for ordering the torture; the evidence of two unexceptionable witneſſes, who agree, is ſufficient for the conviction and condemnation of any perſon. Thoſe that are informed againſt are conſtrained to become their own accuſers; and various arts are uſed to extort a confeſſion from them. The advocate allowed them is under the direction of the inquiſition, and employed chiefly in order to betray them: moreover, when the crimes cannot be proved againſt them, they are only abſolved from proſecution, but their crimes and names are recorded againſt them. The uſe of torture for diſcovering ſecret crimes lying concealed in the mind, is a flagrant inſtance of injuſtice; and perſons are put to the torture upon half full proof of the crime, *i. e.* faultering, defamation, one witneſs of his own knowledge, or when the tokens are vehement, or violent. Theſe tortures are uſed under a pretence of diſcovering the truth, and they are varied and continued with the moſt wanton cruelty. After theſe, and many other ſhocking proceſſes, when the inquiſition has done with the criminals, and condemned them to death, they are turned over to the ſecular arm, with much prayer, and pious intreaty, that their lives may not be touched.

Time is no manner of ſecurity in point of hereſy; nor, does the grave itſelf ſhelter the accuſed from the purſuits of the inquiſition; even the deceaſed have their trials, and they proceed in all their form and ſolemnity againſt the dead carcaſes. The executions are always deferred till the number of the condemned is very great, that the multitude of ſufferers may ſtrike the deeper horror, and make the ſcene more terrible and ſhocking. See Act *of Faith*.

The inquiſition is very ſevere in the Indies. It is true, there muſt be the oaths of ſeven witneſſes to condemn a man; but the depoſition of ſlaves or children are taken. The perſon is tortured till he condemns himſelf; for his accuſers are never brought to confront him. Perſons are accuſed for the ſlendereſt expreſſion againſt the church; or even for a diſreſpectful word of the inquiſition.

The ſtandard of the inquiſition in Spain is a piece of red damaſk, on which is painted a croſs, with an olive-branch on one ſide, and a ſword on the other; with theſe words of the pſalm, *Exurge, Domine, & judica cauſam meam.*

The ſtandard of the inquiſition in Portugal hath their ſuppoſed founder Dominic's picture on one ſide, and on the other ſide the croſs, between an olive-tree and a ſword, with this motto, *Juſticia & miſericordia.*

See on the ſubject of this article Limborch's Hiſt. of the Inquiſition, by Chandler, paſſim. Moſheim's Eccl. Hiſt. vol. iii. p. 113, &c. 8vo.

INQUISITORS, in *Law*, are ſheriffs, coroners *ſuper viſum corporis*, or the like, who have authority to enquire into certain caſes, *ex officio*.

IN QUO, *Medium in quo*. See Medium.

INROLLMENT, the regiſtering, recording, or entering of any lawful act, or inſtrument, in the records of chancery; as a recognizance acknowledged, or a ſtatute, or a fine levied.

Inrollments are alſo made in the rolls of the exchequer, king's bench; and common pleas; in the huſtings at Guildhall, London; and by the clerk of the peace in any county. See Register.

Inrollments, *Clerk of the*. See Clerk.

INSAG, in *Ornithology*, a name given by the people of the Philippine iſlands to one of the ſeveral ſpecies of parrots, common in their woods. The inſag is a very beautiful bird; its body is of a very bright green, and its head of a fine florid red.

INSANITY. See Mental *Derangement*, Mania, and Melancholy.

INSANUM Parliamentum. See Parliamentum.

INSCHI, or Inschi *kna*, in the *Materia Medica*, a name given by ſome authors to the common ginger.

INSCONCED, in the *Military Art*, denotes that part of an army that have fortified themſelves with a *ſconce*, or ſmall fort, in order to defend ſome paſs, &c. See Sconce.

INSCRIBED, in *Geometry*. A figure is ſaid to be inſcribed in another, when all the angles of the figure inſcribed touch either the angles, ſides, or planes of the other.

Inscribed *Hyperbola*, is ſuch an one as lies entirely within the angle of its aſymptotes; as the conical hyperbola doth. See Hyperbola and Circumscribing.

INSCRIPTION, a title, or writing affixed to any thing, to give ſome farther knowledge thereof; or to tranſmit ſome important truth to poſterity.

Antiquaries are very curious in examining ancient inſcriptions found on ſtones, and other monuments of antiquity. Sanchoniathon, contemporary, as it is ſaid, with Gideon, drew moſt of the memoirs whereof his hiſtory is compoſed from inſcriptions which he found in temples, and on columns, both among the heathens and the Hebrews.

It appears, indeed, that the ancients engraved upon pillars the principles of ſciences, as well as the hiſtory of the world. Thoſe mentioned by Herodotus ſhew, that this was the firſt way of inſtructing people, and of tranſmitting hiſtories, and ſciences, to poſterity. This is confirmed by Plato in his Hippias, wherein he ſays, that Piſiſtratus engraved, on ſtone pillars, precepts uſeful for huſbandmen. Pliny aſſures us, that the firſt public monuments were made of plates of lead; and that the treaties of confederacy concluded between the Romans and the Jews were written upon plates of braſs; that, ſays he, the Jews might have ſomething to put them in mind of the peace and confederacy concluded with the Romans. The Greeks and Romans were much addicted to inſcriptions, and were extremely fond of being mentioned in them: and hence it is that we find ſo many in thoſe countries of ancient learning, that large volumes have been compoſed; as the collection of Gruter, &c.

Since Gruter's collection, Th. Reineſius has compiled another huge volume of inſcriptions. M. Fabretty publiſhed another volume at Rome in 1669, wherein he has corrected abundance of errors which had eſcaped Gruter, Reineſius, and other antiquaries, &c. and added a great number of inſcriptions omitted by them. Since all theſe, Grævius has publiſhed a complete collection of inſcriptions, in three volumes folio.

INSCRIPTION, *Academy of*. See ACADEMY.

INSCRIPTIONS, *Notes, or Abbreviations, uſed in.* See CHARACTER.

INSCRUTABLE, UNSEARCHABLE, in *Theology*, is uſually underſtood of the ſecrets of Providence, and the judgments of God, which cannot be found out, or into which human reaſon cannot penetrate.

INSE, in *Geography*, a town of Pruſſia; 22 miles W. of Tilſit.

INSECTS. See ENTOMOLOGY.

INSECTS, *Anatomy of.* Many parts of this ſubject have been already conſidered in the article ENTOMOLOGY, to which we refer the reader: our preſent object is to ſupply what has not been inſerted there.

Organs of Motion.—A ſtriking difference is obſerved in the poſition of the hard parts, which conſtitute the eſſential organs of motion, between this claſs and the mammalia, birds, &c. In the latter, the bones are placed in the centre of the limbs, and are ſurrounded by the muſcles, which are covered externally by the ſkin; while in the former, the reſiſting matters, which are analogous to bones and perform their functions, are hollow, placed externally, ſupply the place of ſkin, and contain the moving powers in their cavities.

The ſtructure and appearances of the external coverings vary conſiderably in the different orders of this claſs. In the crab, lobſter, &c. a hard calcareous cruſt covers the whole body and limbs, ſerving for ſkin and ſkeleton. In the perfect inſects the ſurface of the body is covered by horny ſubſtances of various degrees of hardneſs and reſiſtance. The larvæ have coverings of a ſofter kind, and approaching more nearly, as far as external characters go, to the ſkin of mammalia and of the neighbouring claſſes. Yet this is analogous in its functions to the calcareous and horny cruſts; for it receives the inſertion of the muſcles, and therefore conſtitutes the chief agent of locomotion.

The ſenſible characters of the calcareous cruſt of the crab and lobſter (their *ſhell* as it is commonly called) reſemble thoſe of the ſhells of teſtaceous animals, and in ſome degree thoſe of bone: but the chemical conſtitution is in ſome reſpects different. The very valuable reſearches of Mr. Hatchett have made us acquainted with the chief circumſtances of the compoſition of theſe matters. After having detailed his experiments on ſhells and on the coverings of the echini, he proceeds: "It was now requiſite to aſcertain if phoſphate of lime is a component part of the ſubſtance which covers the cruſtaceous marine or aquatic animals, ſuch as the crab, lobſter, prawn, and cray-fiſh. Pieces of this ſubſtance, taken from various parts of thoſe animals, were at different times immerſed in acetous and diluted nitric acid; thoſe which had been placed in the diluted nitric acid produced a moderate efferveſcence, and in a ſhort time were found to be ſoft and elaſtic, of a yellowiſh-white colour, and like a cartilage, which retained the original figure. The ſame effects were produced by acetous acid, but in a leſs degree; in the latter caſe alſo the colouring matter remained, and was ſoluble in alcohol. All the ſolutions, both acetous and nitric, afforded carbonate and phoſphate of lime, though the former in a larger proportion. There is reaſon to conclude, therefore, that phoſphate of lime, mingled with the carbonate, is a chemical characteriſtic, which diſtinguiſhes the cruſtaceous from the teſtaceous ſubſtances; and that the principal difference in the qualities of each, when complete, is cauſed by the proportion of the hardening ſubſtances, relative to the gluten, by which they are cemented; or by the abundance and conſiſtency of the gelatinous, membranaceous, or cartilaginous ſubſtance, in and on which the carbonate of lime, or the mixture of the carbonate and phoſphate, has been ſecreted and depoſited. And as the preſence of phoſphate of lime, mingled with carbonate, appears to be a chemical character of cruſtaceous marine animals, there is every reaſon to conclude that Linnæus did right not to place the echini among the teſtaceous ones. The preſence of phoſphate of lime, in the ſubſtance which covers the cruſtaceous marine animals, appears to denote an approximation to the nature of bone, which, not only by the experiments of Mr. Gahn, but by the united teſtimony of all chemiſts, has been proved principally to conſiſt, as far as the oſſifying ſubſtance is concerned, of phoſphate of lime." Philoſ. Tranſ. 1799. In a recapitulation of theſe reſearches, in the Tranſactions for 1800, he ſays, "it was proved, that the cruſt which covers certain marine animals, ſuch as crabs, lobſters, cray-fiſh, and prawns, conſiſts of a ſtrong cartilage, hardened by a mixture of carbonate and phoſphate of lime; and that thus theſe cruſtaceous bodies occupy a middle place between ſhell and bone, though they incline principally to the nature of ſhell." Similar reſults to theſe were obtained by Merat-Guillot, who has deſcribed his inveſtigation in the Annales de Chimie, t. 34. From 100 parts of lobſter cruſt, he obtained 60 of carbonate of lime, 14 of phoſphate, and 26 of animal matter. In 100 parts of cray-fiſh cruſt there were 60 of carbonate, 12 of phoſphate, and 26 of animal matter. So far as the horny coverings of inſects have been examined, they correſpond in chemical properties to horn, hoof, ſcales of ſerpents, feathers, &c. and do not owe their firmneſs to calcareous matter, which ſeems not to be an eſſential part in their formation. See HORN.

An intereſting enquiry ariſes here, concerning the mode of formation of theſe coverings; but our data are hardly ſufficient to reſolve it ſatisfactorily. "Some obſervations," ſays Cuvier, "ſeem to prove that there are teſtaceous animals, which loſe their ſhells entirely at certain periods, and are ſupplied with new ones. But this reproduction might be effected by developement like that of the antler: and if it be alſo a developement, which produces the interior layers of thoſe ſhells, which do not drop off, it may be compared to that which forms the inner lamina of the horns of cows, ſheep, and other ruminating mammalia, and alſo to the production of the epidermis in all animals: that is to ſay, it is a deſiccation, a kind of death of a membrane, which appeared to have ſome ſort of organization, as long as it was protected from the contact of the external air, or had not acquired completely its characteriſtic ſolidity. All the hard parts which hold the place of bones in invertebral animals ſeem to be developed in this manner. In the crab and lobſter, for example, that which ſerves at the ſame time for integuments and ſkeleton, grows no more when it has once attained its perfect hardneſs; yet the ſoft parts ſtill continue the progreſs of their developement. When they are too much confined by the hard covering, that ſeparates and is detached: but another is found under it, which was in a ſtate of formation while the former was detaching itſelf, or, as we may ſay, dying. This new covering is at firſt ſoft, ſenſible, and even vaſcular; but a quantity of calcareous matter, previouſly collected in the ſtomach, is very ſoon conveyed to it, hardens it, obſtructs the pores and veſſels, and renders it, in ſhort, perfectly ſimilar to that of which it has ſupplied the place. Inſects do not acquire their perfect hardneſs until they have taken their laſt form, and have no further change of ſkin to undergo; but all the ſkins which they had caſt off before, although ſofter, were dead, and already replaced by others, developed before they were diſcharged. Thus all the hard external organs of white-blooded animals, whatever their conſiſtence and chemical nature may be, ſhould rather be compared, in their mode of growth, to the epidermis, to hollow nails, and horns, than to true bones." Leçons d'Anatomie comparée, t. 1, p. 118.

Epidermis.—Cruſtacea and inſects, whether in their larva or perfect ſtate, have a true epidermis; but, as this integument, when it has once become dry and hard, is no longer ſuſceptible of that extenſion which is neceſſary to accommodate the growth of the animal, it is ſeparated at certain periods, which are definite in each ſpecies, but influenced conſiderably by the atmoſpherical temperature: the animal quits its ſkin, paſſing out from it as from a ſheath. This proceſs is called moulting: the inſect, in many caſes, is ſeveral days preparing for it, and ſometimes periſhes. Moſt of the larvæ of the papilio and bombyx kinds change their covering ſeven times before they paſs into the ſtate of chryſalis. The bombyx caja has ten ſucceſſive coverings.

This moſt ſingular proceſs is not analogous to the mere ſeparation of the cuticle in the human ſubject; for the parts which are detached in inſects, in many caſes afford attachment to the muſcles of the animal. Thus, in the cruſtacea the whole ſkeleton is ſhed, and this takes place annually. "Theſe frequent moultings," ſays Lyonet, "of the caterpillar of the phalæna coſſus are the more ſingular, inaſmuch as the caterpillar does not ſimply change its ſkin, but caſts its whole external covering, in which we obſerve the head, jaws, corneæ, all the ſcaly parts compoſing the lips, the cirri, the ſpinning hole, the antennæ, and even the ſcales encloſed within the head, and affording attachment to ſeveral muſcles; alſo the ſtigmata, the nails, ſcales, and hooks of the feet, the hairs, the anus, in ſhort all the viſible external ſurface of the animal. In diſpoſing itſelf for this operation, it paſſes ſome days without taking any nouriſhment; the muſcles, and other interior organs of the head, are detached from the old cranium, and withdrawn into the neck; they form a new covering, ſimilar to that which they have left, but larger, and at firſt ſoft. When the new ſkin, and all the other parts, which contribute to the covering of the caterpillar, are formed, the old one is opened, and the animal withdraws from it by an operation ſo much the more difficult in conſequence of the weakneſs cauſed by the ſoft ſtate of the new organs, which will not allow it to act with vigour, nor to take any nouriſhment for ſome days.

"The caterpillar, thus newly clothed, exhibits different proportions from thoſe which it had before moulting; the head, legs, and all the horny parts are ſenſibly larger in compariſon to the reſt of the body; theſe therefore do not increaſe afterwards. The body and ſoft parts of the animal only grow, until they become again too large for their covering, and a new moulting is neceſſary." Lyonet, Traité Anatomique de la Chenille, p. 7.

Rete Mucoſum.—The place of this organ is held in the cruſtacea, by the calcareous ſhell, which immediately ſucceeds the epidermis; its colour is commonly a dull green, ſometimes red, blue, white, or black. Alcohol, acids, and particularly the application of heat, often produce remarkable changes in theſe colours, as we may obſerve in the lobſters brought to our tables. In larvæ a layer of mucous ſubſtance is ſeen between the epidermis and the muſcles; and the colours of this vary infinitely in the different ſpecies. It is particularly remarkable for its brilliancy in caterpillars, and the larvæ of ſome hymenoptera; it gives to their bodies the pureſt and moſt lively tints, of which the ſhades and ſymmetry are admirable. Red, purple, violet, blue, green, yellow, ſcarlet, black, &c. are diſtributed in the moſt regular and ſtriking manner. Probably the brilliant colours of the perfect inſects are owing to the mucous body dried and blended with the horny covering. For whilſt the lepidoptera are in their chryſalis ſtate, the ſmall coloured ſcales which will afterwards adorn their wings, appear like the mucoſity which is under the ſkin of the caterpillars. The colours of the ſpiders are alſo owing to this mucous matter, which is found under their ſkin, and has the appearance of ſmall glandular points marked by different ſhades of colour. But in the coleoptera, and in ſeveral other orders, the colours ſeem to reſide in the horny tiſſue, as thoſe of the teſtacea do in their calcareous ſhells.

Nothing can be ſeen in this claſs, which can be compared to the cutis; there is a pellicle under the ſhell of the cruſtacea, but it is fine, tranſparent, and has very little conſiſtence. The layer which is ſeparated from larvæ in their moultings, is of the ſame nature and thickneſs as that which is under it and ſucceeds. The coverings of the contracted chryſaliſes, ſuch as thoſe of the lepidoptera and diptera, cannot be regarded as a true ſkin; it is rather a horny epidermis. Laſtly, in their perfect ſtate, inſects have nothing in their coverings which can be compared to cutis. The hairs of inſects ſeem to be productions of their epidermis; for they are diſcharged with that in moulting, and are ſupplied by new and longer ones. The ſcales of the wings and body in the lepidoptera and ſome other orders, are ſmall horny plates, differently coloured, implanted in the ſkin, and placed one over the other, like tiles in the roof of a building. The plumes of ſome inſects are prolongations or ſhreds of the wings, furniſhed with long hairs on their ſides.

Joints.—The cruſtacea and the proper inſects agree in the kind of their articulations; the particular nature of which ariſes from their hard parts being placed externally to the muſcles. The former being made like ſheaths, and having their cavities filled by the muſcles, cannot be articulated by ſimple and plane ſurfaces; their joints therefore exhibit no ſpecimens of arthrodia and enarthroſis. All their moveable articulations may be reduced to three kinds. Where the parts require a ſolid point of ſupport, the ginglymus is employed; the horny coverings of the limbs, being tubular, muſt reſt on each other in two points of their circumference at leaſt, and this arrangement neceſſarily determines the ginglymoid form. Where a ſolid point of ſupport is not required, the parts are merely ſuſpended by ligaments, or are articulated by a kind of ſetting in. In the latter conſtruction one part enters and is received into the hollow of another. Thus the thighs of inſects are ſet in the thorax, and the rings of the abdomen are ſet into each other. Since the part which receives, and that which is received, are ſegments of a ſpheroid, the latter may perform a twiſting motion: it may be puſhed more or leſs completely into the cavity, either equally in its whole circumference, or to a greater degree on one or the other ſide; but flexion properly ſo called cannot be performed. The parts which are connected by ginglymus, and which are chiefly the different portions of their legs, have deep notches on that ſide where the flexion is moſt extenſive; the interval is filled with a pliant membrane, and there is no other ligament. The articular tubercles and excavations are ſo arranged that they cannot be luxated without fracture.

Muſcles.—The muſcular ſyſtem of the cruſtacea is confined to the motions of the legs, tail, and falſe feet; there are no muſcles for moving the head on the thorax, ſince the two parts are conſolidated into one piece in this order. The antennæ, the jaws, and the palpi, have particular muſcles, but we ſhall not conſider them at preſent. The tail is a very principal part of the body in moſt cruſtacea. It conſiſts of a very ſtrong and moveable member, which they employ with great effect both in jumping and ſwimming. It is compoſed in ſeveral monoculi of long threads, which in the polyphemus (moluſca crab) are ſolid and moveable at their baſes only. In the crabs it is ſhort, flattened, and curved under the body in a depreſſion placed between the legs. The cancer bernhardus (hermit crab) has a ſoft tail without ſcales, which it introduces into empty ſhells or hollow ſtones.

The tail deſerves a particular deſcription in the lobſter, where it is formed of ſix chief ſegments, and terminated by five plates. The former are not all of exactly the ſame figure; they are convex above, and cover one another like tiles; below they are narrower, and united by a looſe membrane which allows them conſiderable mobility. In the latter ſituation, at the angle of union between their dorſal and lower portions, they have a kind of firm fins, bordered with ciliated proceſſes, and formed of ſeveral articulations. Theſe are called falſe or ſwimming legs (pedes natatorii). Theſe admit of being moved from before backwards, and a little from without inwards, by means of ſmall muſcles contained in their interior, but not differing ſufficiently from thoſe of the true legs to merit a particular deſcription.

The five plates, which terminate the tail, conſiſt of two pairs and a ſingle one; the latter is placed in the middle, and articulated directly to the laſt ſegment. The opening of the anus is found under it. In ſome ſpecies it is divided in its middle, ſo as to admit a ſlight motion. Each of the lateral pairs is ſupported by a common piece articulated to the laſt ſegment of the tail. The internal plate of each pair is ſimple, and ciliated, like the middle one, only at its extremity; but the external is in a manner articulated, or rather formed of two pieces; the firſt of theſe covers by its extremity, which is denticulated, the ſmaller which ſucceeds, and of which the edge is ſet with very cloſe cilia. The muſcles which move this tail are ſo ſingular, as to merit a diſtinct deſcription.

The muſcles of the tail, in the lobſter, form two maſſes, ſeparated from each other by the inteſtinal canal. In the dorſal maſs, which is the thinneſt, and leaſt complicated, three kinds of fibres may be obſerved. The firſt conſtitute a muſcle attached to the dorſal portion of the thorax towards its poſterior fourth part. It is then directed obliquely backwards and outwards towards the ſides of the firſt ſegment of the tail, in which it is inſerted. The portion of one ſide acting ſeparately, will carry the tail towards the right or left; when both act together, they will extend the tail, and maintain it in the extended ſtate. The ſecond and third ſeries of muſcular fibres are extended through the whole length of the tail in two parallel and contiguous lines. They ariſe from the upper and lateral portions of that ſeptum of the thorax, on which the branchiæ are applied, by ſeveral digitations. When it has arrived at the firſt ring of the tail, a ſmall interſection is obſerved on the ſurface, and we obſerve that a ſmall bundle of fibres turns off to be inſerted into this firſt annular ſegment; and a ſimilar inſertion takes place in each of the ſucceeding rings. This diſpoſition gives to the internal band the appearance of a twiſted cord. The external portion of the dorſal maſs is formed of diſtinct longitudinal fibres. Theſe three orders of muſcles have much analogy to the ſtraight dorſal muſcles of caterpillars, as we ſhall ſee in the ſequel.

The ventral maſs of the muſcles of the tail is much thicker and more complicated than thoſe of the back. In order to give a clear notion of its compoſition, we ſhall deſcribe it as obſerved in three aſpects. In the firſt place, from the back; the muſcles which we have deſcribed, as well as the inteſtinal canal, having been removed; ſecondly, from below, the ſcales which cover the under ſurface of the tail, and the nerves having been taken away; and thirdly, on the inſide, a longitudinal ſection having been carried through the muſcle in its middle line, in order to expoſe the internal ſtructure.

The ventral muſcle of the tail, on its dorſal aſpect, ariſes in the interior of the thorax, above the intricate bony texture, containing the muſcles of the legs. It is then divided into a right and left portion; each of which is formed of three broad digitations. Over the firſt ſegment of the abdomen, its longitudinal fibres dip under others, which turn round and embrace them. The reſt of the muſcle, in the whole length of the tail, is thus formed of two ſeries of convex fibres curved in parallel directions, placed laterally with regard to each other, and ſeparated from right to left by a channel in which the inteſtinal canal is lodged.

On the under ſurface three very diſtinct orders of fibres may be ſeen. The firſt is produced from the inferior ſurface of the digitations which ariſe from the bony frame-work of the thorax. The ſecond conſiſts of oblique fibres, which are a continuation of the former, extending from the middle line, in which the nervous cord is placed, to the ſides of the rings at the angle of union between their dorſal and ventral portions. Each of theſe angles, from the firſt to the ſixth, has two ſtrong bundles. The third ſeries is made up of tranſverſe bundles deſcribing arcs, of which the convexity is downwards. Theſe muſcular flattened hoops correſpond to the interſections of the rings, and ſeem to form derivative pullies for the oblique fibres juſt mentioned.

Laſtly, the ventral muſcle of the tail, divided longitudinally in its middle, reſembles a rope with the ſtrands rather obliquely diſpoſed. The fibres belonging to the tranſverſe bundles are diſtinct and narrower.

From this ſingular complication it reſults, that the muſcle, when inſulated from all its adheſions, conſtitutes a very cloſe twiſt, the threads of which, inſtead of acting in the longitudinal direction, move obliquely in the canal which they occupy between the neighbouring fibres.

The legs of the cruſtacea vary in number and ſize. Their figures are very different in the monoculi; ſometimes they hold the place of palpi, jaws, fins, branchiæ, &c. They differ conſiderably in form in the crabs, particularly the firſt pair. We ſhall deſcribe the legs of the crab and lobſter as an example of theſe organs. They are uſually five in number on each ſide, and each has ſix articulations. The firſt pair is conſiderably the largeſt, and forms what we call the claws.

The hip, or haunch, is attached to the cheſt, and moves only from before backwards. It ſupports one diviſion of the branchiæ, as well as the ſecond piece of the member, which correſponds to the thigh. The latter is flattened, ſhort, nearly ſquare, ſmooth, and a little curved. The plane of its articulation is parallel to the length of the piece; and as the two muſcles which move it are inſerted into the two moſt remote points, the thigh is ſituated horizontally. It has a hinge-like motion on the hip, combined of the two directions from before backwards and from within outwards. Its motion on the leg, which is very limited, takes place only from below upwards, and produces the approximation of the limb to the cheſt. The third portion correſponding to the leg is alſo rather flattened, particularly at its femoral extremity. It is ſlightly curved in the direction of the thigh, ſo as to correſpond to the convexity of the thorax. Towards the tarſal end it becomes larger and rougher: its motion on the thigh is very limited. The fourth articulation is intermediate between the pincer and the leg, on which it moves in a very diſtinct angle. The pincer compoſes the fifth, and by far the largeſt piece. It is terminated on the outſide by a pointed and ſerrated projection; and it receives on the oppoſite ſide a moveable pointed piece or pollex, capable of being oppoſed to it, which, with the other, conſtitutes the pincer. The motion of this on the fourth piece is from without inwards. The two following pairs of legs reſemble the former on a ſmaller ſcale, with this difference, that the two pieces, compoſing the pincer, are of equal ſize. The two laſt pairs of legs differ from the three others in not being terminated by a pincer, but by a ſingle nail. In every other reſpect they reſemble the two preceding pairs.

Muſcles of the Legs.—Each articulation has an extenſor and a flexor muſcle. The extenſor of the hip is ſituated in the interior of the thorax, on the horny piece which ſupports the branchiæ, rather in front of the hip, which it draws forwards. The flexor ariſes from the ſame part farther back, and produces the contrary motion to the preceding.

The extenſor of the thigh is ſtronger than the flexor; it is attached to the inner and front part of the hip, and to the ſuperior eminence of the thigh. It depreſſes rather than bends. The flexor, or rather the elevator of the thigh, is ſhorter than the former: it occupies the poſterior internal ſurface of the thigh, and is inſerted into the inferior eminence.

The extenſor of the leg is placed in the hollow of the thigh, of which it occupies the whole breadth; it is inſerted into the external border of the leg. The flexor is leſs powerful, lies under the extenſor, and is fixed to the inner edge.

The extenſor of the firſt piece of the tarſus is attached to the whole upper edge of the leg, and is inſerted into the higheſt eminence of the fourth piece. Its flexor ariſes from the lower edge of the leg, and is inſerted into the lower eminence.

The extenſor and flexor of the pincer occupy and divide the interior of the fourth piece: their functions are determined by their ſituation. The extenſor of the moveable piece or pollex is a very ſmall muſcle, occupying the upper part of the pincer: its flexor occupies all the reſt of this part, is a very bulky muſcle, and has a flattened oblong bony tendon in its middle. From this muſcle ariſes the great power of the animal in ſeizing and holding objects.

Organs of Motion in the Larvæ of Inſects.—As inſects undergo conſiderable changes of form at certain epochs of their life, they exhibit remarkable differences in their organs of motion. Hence it becomes neceſſary to deſcribe them in their various ſtates. All the winged inſects, which undergo a complete metamorphoſis, differ very conſiderably in their firſt ſtate from that which they have in the ſequel; and the moſt ſtriking of theſe differences regard the moving powers. At this time they are called larvæ or caterpillars; and they preſerve this form for a longer or ſhorter time after quitting the egg. They are covered with a flaccid and ſoft ſkin, divided into ſegments or rings ſuſceptible of motion on each other, by means of ſmall muſcular bands ſituated in the interior of the body. Frequently their motions are performed ſimply by crawling on theſe rings, after the manner of reptiles; or, by reſting ſucceſſively each of the ſegments of the body on the plane which ſupports it. Such is the caſe with the larvæ of the diptera, and of moſt of the hymenoptera. Sometimes the ſurface of theſe rings is furniſhed with ſpines, ſtiff briſtles or hooks, in order to give them a firmer hold on bodies: this may be obſerved in ſome flies, œſtri, tipulæ, &c.

On the under ſurface of the body in ſome orders, there are ſix feet near the head, each of which is formed of three articulations: the laſt is horny and terminated in a hook. By oppoſing theſe to each other the inſect can hold any object, hook itſelf to it, and then draw the reſt of the body towards this fixed point. This formation is ſeen in the coleoptera, and many of the neuroptera. The ſix feet are very ſhort, and hardly ſuſceptible of any uſeful application in ſome other coleoptera, *viz.* ſuch as live in the interior of wood, as the cerambices, rhagia (Fab.), &c. The latter move in the hollows which they excavate by means of their jaws, by which they attach themſelves, and with the aſſiſtance of plates or tubercles, with which their ſkin is furniſhed on the back and belly: their mode of proceeding may be compared to that of ſweepers in chimnies.

Laſtly, the lepidoptera, and ſome hymenoptera have, beſides the ſix horny articulated feet, a variable number of falſe feet, not articulated, terminated by hooks diſpoſed in circles and half circles, and attached to the ſkin on retractile appendices or tubercles: they move by fixing themſelves to bodies by means of theſe organs.

The larvæ of ſuch inſects as undergo an incomplete metamorphoſis, as the hemiptera, and of ſuch as paſs through none at all, as the aptera, except the flea, do not differ from the perfect inſect in the feet.

After this general ſtatement of the external organs of motions in the larvæ, we ſhall particularly deſcribe the muſcles of ſome. We ſhall firſt mention thoſe of the proper caterpillars; then thoſe of a ſcarabæus, which lives under ground; of a hydrophilus, which inhabits the water; and of a cerambyx, which is found in the hollows of wood.

1. *Muſcles of Caterpillars.*—The deepeſt ſtratum of muſcles in the caterpillar is formed of four principal rows; two correſponding to the back, and two to the belly: their direction is longitudinal. Those of the back are ſeparated from each

other by the longitudinal veſſel, and from thoſe of the belly by the tracheæ. They begin at the union of the firſt and ſecond rings, by two faſciculi ſlightly ſeparated from each other, which are inſerted into a kind of tendinous line produced by the union of the ſecond with the third ring. The ſame ſtructure exiſts in the ſubſequent rings. On the third, the fibres of the two faſciculi, although ſtill diſtinct, are much more conſiderable: on the fourth the internal faſciculus alone has its fibres ſeparate. The muſcle is continued, without any apparent interſection, over all the other rings. It diminiſhes in thickneſs towards the oppoſite end of the body, and forms again ſeveral faſciculi; at firſt three, then four, and, laſtly, five or ſix. The body is ſhortened when theſe muſcles act in conjunction with thoſe of the belly: it is curved upwards when they act alone.

The longitudinal muſcles of the belly are ſeparated from each other by the medullary cord, and from thoſe of the back by the tracheæ. Their direction is preciſely the ſame with that of the dorſal muſcle. They commence at the union of the two firſt rings by ſeveral faſciculi, which are united into one maſs over the third ring. Their fibres are ſeparated again behind, higher or lower according to the ſpecies, and form four or five muſcular cords, which terminate towards the laſt pair of falſe feet. Theſe aſſiſt the dorſal muſcles in ſhortening the body when both ſets contract together; but they antagoniſe them, when they act ſeparately, for they then incurvate the body downwards.

Between the long muſcles of the back and the ſkin ſhorter ones are found, having an oblique direction. Some are extended from without inwards, towards the dorſal line, between the annular interſections. Others occupy the ſame interval, but have an oppoſite direction, paſſing from within outwards, ſo as to deſcribe with the former the figure of the letter V. Theſe two orders of oblique muſcles have not every where the ſame quantity of fibres. In the firſt rings they are narrow and long: thoſe of the fourth, fifth, and ſixth are much ſhorter: further back they become much longer and more numerous in ſome ſpecies, while in others they ſtill continue broad and ſhort. Theſe muſcles act ſeparately on each ring, which they ſhorten by their ſimultaneous contractions; but, as they do not extend over the whole length of the ring, the parts correſponding to the folds, over which the oblique muſcles do not paſs, are elongated, when, by the action of the latter, the diameter of the ring is diminiſhed: thus progreſſion is facilitated.

Under the long muſcles of the belly is found another ſtratum, of which the fibres are oblique. Theſe very much reſemble the oblique muſcles of the back; and may be diſtinguiſhed, according to their directions, into two orders. Thoſe of one ſet are found nearer to the middle ventral line, in which the knotted nervous cord is found; and aſcend from within outwards, in the intervals of the rings. The others are not ſo oblique, with the exception of the three ſuperior pairs. Theſe muſcles, therefore, form, with the preceding, an angle, ſimilar to this kind of *A*.

The oblique muſcles which run from within outwardly, or the moſt internal, have many fibres. They uſually conſiſt of three or four diſtinct faſciculi. Thoſe which extend from without inwardly, or the moſt external, have fewer fibres, and never more than two faſciculi.

The action of theſe muſcles appears to be ſimilar to that of the oblique muſcles of the back; but it is probable that they alſo extend immediately the ſkin of the feet on which they are ſituated.

Beſides the longitudinal and oblique muſcles of the back and the belly, caterpillars have ſome which are lateral; that is to ſay, muſcles ſituated below and above the ſtigmata or apertures, which ought to be deſcribed ſeparately. Theſe muſcles are of three kinds, the *ſtraight*, the *tranſverſe*, and the *oblique*.

The ſtraight lateral muſcles are ſituated between the annular ſegments, above the ſtigmata. They are all placed longitudinally one over the other. Their points of attachment are covered by the tranſverſe muſcles. They ſeem intended to bend the body towards the ſides when they act ſeparately; but when they contract, in concert with the long muſcles of the back and abdomen, they ſhorten the body, and thereby aſſiſt its progreſſion.

The tranſverſe lateral muſcles are of two kinds: ſome, which are longer than the others, ariſe from the intervals unoccupied by the attachments of the ſtraight lateral muſcles, and are inſerted at the termination of the oblique external muſcles of the abdomen. Their fibres are diſpoſed ſomewhat in the form of a fan. The others have the faſciculi formed of parallel fibres; they are ſhorter, and are extended in each of the rings between the ſtraight, lateral, and oblique muſcles of the abdomen. Theſe muſcles diminiſh the diameter of each ring, and conſequently lengthen it in each of its folds. This mode of action is neceſſary for progreſſion.

The oblique lateral muſcles are ſituated on each ſide of the ſtraight. They proceed in an oblique direction from below upward, under the inſertion of the ſtraight lateral muſcles, which they aſſiſt when they act together.

Such are the muſcles of the body in general; but the true and falſe feet, and the head, have particular muſcles, which muſt be deſcribed ſeparately.

The muſcles of the true or ſcaly feet are ſituated within the three articulations of which theſe feet are formed. They may be diſtinguiſhed into thoſe which move the articulations, and thoſe which act on the *unguis*, or claw, that terminates them.

The muſcles of the firſt joint conſiſt of five or ſix faſciculi, which ariſe from the ſuperior margin of this articulation, and are inſerted into the ſuperior margin of the next. The muſcles of the ſecond joint are nearly equal in number, and are inſerted into the ſuperior margin of the third.

The muſcles of the unguis terminate by two tendons: but they are formed of ſeveral faſciculi, ſome of which ariſe from the ſecond and third joints in two very diſtinct layers; others from a line which correſponds with the convexity of the unguis; and laſtly, others from the line which anſwers to its concavity. Theſe tendons are inſerted into two tubercles at the ſuperior extremity of the unguis, on the concave ſide, towards its point. They ſerve to bend the unguis, which probably recovers its poſition by the elaſticity of its articulation.

There are two muſcles to each of the membranous or falſe feet. Their direction, with reſpect to the body, is almoſt tranſverſe. They extend from the centre of the feet, into which they are inſerted towards the back, and beyond the ſtigmata, whence they ariſe by lateral bands more or leſs oblique. Their uſe is to draw the centre of the foot inwardly, and to retract the hooks with which the limb is armed. It is probable that the contractions of the oblique muſcles of the abdomen produce the oppoſite effect.

With reſpect to the muſcles of the head, we ſhall at preſent deſcribe only thoſe which produce its entire motion. We ſhall notice the others in treating of the different functions to which they are ſubſervient. The muſcles which act on the head, bend it upward, downward, and towards the ſides. Thoſe which bend it upward are very numerous. They ariſe from the ſecond and firſt ring, and are inſerted into different points of the occiput; ſome near the middle line, others more laterally. They form, in general, two faſciculi. The moſt internal is the leaſt bulky. The lateral flexors are very oblique. They ariſe from the inferior or abdominal part of the body, and extend to the lateral parts of the occiput. The inferior flexors, which bend it downward, appear to be the continuation of the ſtraight muſcles of the belly. They conſiſt of eight or nine faſciculi.

2. *Muſcles of the Larva of a Scarabæus.*—The larvæ of the ſcarabæus have the body arched, and convex ſuperiorly, and concave on the ſide next the feet. The back and the belly are ſeparated by a membranous border, which has folds, and is ſituated under the ſtigmata. Theſe larvæ have only ſix articulated feet, none of which are membranous. On opening theſe larvæ longitudinally, either on the back or the belly, we obſerve three layers of deep-ſeated muſcles—the lateral, the dorſal, and the ventral.

The dorſal layer is formed of two tolerably diſtinct ſeries of fibres. One ſeries is external, and occupies the intervals of the ten firſt rings; that is to ſay, thoſe which are furniſhed with the ſtigmata. The muſcles which compoſe this ſeries are narrow, and preſerve a longitudinal direction. The ſecond ſeries is produced by fibres, which are ſomewhat oblique, and extended in the ſame ſpace, but more towards the middle line. Theſe muſcles are broader and ſtronger towards the head, and more narrow and leſs fibrous towards the tail. They terminate between the tenth and eleventh ring by a very narrow fleſhy band. Theſe muſcles ſeem intended to ſhorten the dorſal portion of each of the rings: this action diminiſhes the convexity of that part, and thereby ſerves to aſſiſt progreſſion.

Near the middle line, between the ninth and tenth ring, there are two ſmall muſcles a little oblique; but between the twelfth and the laſt ring we obſerve only one ſeries of ſmall ſhort muſcles, which occupy all the convexity deſcribed by the curvature. The action of theſe muſcles is obviouſly the ſame as that of the preceding, to which they are acceſſories.

When the firſt layer of dorſal muſcles is removed, we find fibres preciſely ſimilar underneath, but running in the oppoſite direction. Finally we obſerve, in the dorſal layer, lines of very ſhort muſcular fibres above the inferior plane of the ninth and tenth ring. The uſe of theſe little muſcles is probably the ſame as that of all the preceding, though their action is leſs apparent.

The ventral layer very much reſembles that of the back. Theſe muſcles, like the dorſal, form planes of oppoſite directions; the moſt deep-ſeated proceeding from the internal ſide, while thoſe which are neareſt the ſkin aſcend from the external ſide. This produces a ſmall but very regular rhomboidal figure in the middle of each ring on the line biſecting the belly. The action of theſe muſcles is the oppoſite of that of the dorſal layer.

On the laſt ſegment, and towards the part that anſwers to the anus, we obſerve a bundle of tranſverſe fibres, which, by their contraction, doubtleſs ſerve the purpoſe of a ſphincter.

The lateral layer of muſcles is compoſed of three kinds of fibres, which are very diſtinct with reſpect to their courſe. They repreſent a lace paſſed through the meſhes of a net. All theſe muſcles are ſituated behind the ſtigmata, and inſerted into the folds which ſeparate the belly from the back on both ſides.

Thoſe of the firſt order are completely tranſverſe. They extend over the union of each ring with the ſucceeding in the ſpace included between the ventral and dorſal muſcles. It is obvious that they muſt diminiſh, by their contractions, the diameter of the body, and conſequently extend it longitudinally. Theſe muſcles are in general very narrow.

The ſecond ſet is formed by oblique fibres which aſcend from without inwardly towards the middle ventral line, from the union of one inferior ring to the union of the preceding. Theſe muſcles are broad and very ſtrong, they ſerve to form the folds of ſeparation between the back and the belly.

The muſcles of the third order are leſs oblique than the preceding, to which they appear to be acceſſories. Each of the muſcles which compoſe this diviſion ariſes from the middle of a ring, and is inſerted under the head, where the preceding muſcles are inſerted, that is to ſay, on the ventral ſide.

It ſhould be remarked, that the two laſt rings have no lateral muſcles.

The muſcles of the head are very ſtrong, the flexors are attached to the ventral muſcles above the union of the ſecond ring with the third. They are formed of three principal faſciculi, which approach each other, and are inſerted into the poſterior and inferior part of the head, at the baſe of that ſcaly piece called, by Latreille, *ganache.* The extenſors or levators of the head conſiſt alſo of three faſciculi, but they are longer and ſtronger than the former. They have their origin in the ſide, and penetrate under the tranſverſe and oblique muſcles; one is attached to the ſixth ring; another to the fifth, and another to the fourth. They are inſerted into the poſterior lateral parts of the head.

3. *Muſcles of the Larva of a Hydrophilus.*—The larvæ of the hydrophili are elongated. Their body is ſomewhat flat, and all its rings are diſtinct. They not only walk very quick, but they even ſwim with great velocity, in conſequence of different inclinations ſuddenly and ſucceſſively given to the body.

Theſe larvæ, when opened longitudinally, likewiſe exhibit four different kinds or diviſions of muſcles: thoſe of the belly, thoſe of the back, and thoſe of both ſides.

The ventral muſcles very much reſemble thoſe of caterpillars: they are formed of two diſtinct layers. The deepeſt, or that which firſt appears on the belly when examined through an opening on the back, is compoſed of longitudinal fibres with interſections which correſpond to each ring; the ſecond layer, or that which is next the ſkin, is entirely covered by the preceding; it is compoſed of oblique fibres, which croſs each other in the form of an X, and which are extended longitudinally in each ring.

The dorſal muſcles are long, extending from the head to the tail, and forming on each ſide two rows of fibres, which appear twiſted over each other like ropes. They are broadeſt towards the head. Their fibres are inſerted partly into the inferior border of an anterior ring, and partly into the ſuperior border of the next ring.

Theſe long muſcles cover ſome which are oblique, and croſs each other in the form of an X. They extend from the middle part of one ring to the anterior edge of that which ſucceeds it.

The deep-ſeated lateral muſcles, which are numerous, have a tranſverſe direction. Each ring has three or four, and their courſe is ſuch, that they reſemble the letters N or M lying on one ſide, thus Σ Z.

Beneath the tranverſe lateral there are ſome longitudinal muſcles that have a ſmall degree of obliquity: they form a pretty large ſurface, which is uninterrupted throughout its whole length, and confounded with the oblique muſcles of the belly. Their fibres determine the chief motions of the body, in the ſame manner as the long muſcles of the back and belly.

The muſcles of the feet are the ſame as in the perfect inſect.

The head has no particular muſcles. The long muſcles of the back, being inſerted into the occiput, become extenſors. The firſt tranſverſe lateral pair are inſerted beneath the head, and produce the lateral flexion. The long oblique muſcles, which terminate at the inferior part of the head, become real flexors.

4. *Muſcles of the Larva of a Cerambyx.*—In the larvæ of the cerambices we find the ſame muſcles as in thoſe of the ſcarabæi; but as the ſhape of the body differs conſiderably in theſe two kinds of larvæ, there reſults ſome variation in the form and extent of the muſcular organs.

A great part of the head of the larva of the cerambices can be drawn within the ſkin whenever the animal pleaſes. Very ſtrong muſcles, ſimilar to thoſe we have deſcribed in the ſcarabæus, are appropriated to this function. As the head, which is very large, enters into the body, the extremity which receives it is ſomewhat thicker than the ſame part of the ſcarabæi, and the muſcles which move the rings are more extenſive than theirs.

The flat fleſhy tubercles which we find continued along the back and belly, are a kind of feet, which this larva uſes in progreſſion. They move by the alternate contractions of the correſpondent muſcles: this larva, therefore, moves with equal facility on the back and on the belly.

Of the Organs of Motion in Perfect Inſects.—The great variety of motions which inſects are capable of performing, entitles them to hold the firſt rank among the animals that have no vertebræ. We diſcover, in theſe minute beings, all the requiſites neceſſary to produce thoſe voluntary actions, the execution of which aſtoniſhes us in vertebral animals of far greater magnitude. They even unite ſeveral functions which are very ſeldom found combined in the other claſſes; for inſects walk, run, leap, ſwim, and fly with as much facility as the mammalia, birds, and fiſhes exerciſe one or more of theſe faculties.

Inſects are probably indebted for this advantage to the numerous articulations of which their bodies are formed. We muſt therefore pay attention to their different articulations, before we proceed to examine the actions they permit or produce.

1. *Of the Head.*—For a deſcription of the manner in which the head is articulated to the thorax, ſee Entomology, under the diviſion *Caput*, or *Head*.

The muſcles which move the head are ſituated within the thorax. We ſhall deſcribe here only thoſe moſt generally met with. The levators or extenſors of the head are commonly ſituated in the ſuperior part of the corſelet, and the depreſſors inferiorly.

Immediately beneath the middle dorſal part of the corſelet, we find a pair of muſcles which ariſe from the anterior portion of the ſcutellum, when that part exiſts; or from the ſuperior part of the pectus. Theſe muſcles are inſerted into the poſterior and ſuperior part of the head, on the edge of the occipital hole: they draw the head back, and lift it up when it is depreſſed.

On the lateral parts of this firſt pair we find another which is more ſlender: the inſertion of this pair likewiſe takes place at the occipital hole, but more outwardly. They ariſe obliquely from the lateral parts of the corſelet. Theſe muſcles turn the head to one ſide when they act ſeparately; they raiſe it, and bring the mouth into the middle line when they contract together. It will be eaſily conceived that inſects which have the head articulated like a knee, theſe rotatory muſcles are much ſtronger and more conſpicuous.

The flexors of the head are alſo four in number, two on each ſide. The firſt pair ariſes in the internal inferior part of the pectus, from a ſmall horny proceſs, which, in the coleoptera is of a ſquare form, and has the four angles terminated by ſolid branches. Theſe muſcles extend directly to the inferior part of the occipital hole. From their poſition they doubtleſs move the head directly backward. The ſecond pair, which are much ſhorter, ariſe from the inferior lateral part of the corſelet, and proceed to the ſide of the preceding, with which they concur in their effect when they act together; but when one of the two contracts ſeparately it bends the head to the ſide.

2. For the deſcription of the *thorax* or corſelet, of the *pectus* or breaſt, and of the *abdomen* or belly, ſee Entomology, under the reſpective diviſions.

3. *Of the Members.*—For an account of the number and ſtructure of the feet, ſee Entomology under the diviſion *Members*.

The motion of each joint is performed in a ſingle place. It is provided with two muſcles only, which are enveloped in the preceding joint. They are an extenſor and a flexor.

In the coleoptera the coxæ move by a kind of rotation on their longitudinal axis, which is ſituated tranſverſely, and forms, with the middle line of the body, an angle more or leſs approaching 90°. As the femur is attached to the internal extremity of the coxa, the diſtance between the thighs is greateſt in thoſe inſects in which the femur is moſt bent with reſpect to the coxa, to which it is articulated. It is obvious, therefore, that the poſition of the plane in which this flexion is made, depends upon the ſituation of the coxa; when it is turned forward, the plane is vertical; when turned backward the plane is always more oblique; and in the inſects that ſwim, it is even horizontal. It appears, then, that the almoſt imperceptible motion of the coxa determines the moſt remarkable movements of the feet.

The muſcles of each pair of coxæ and femora are ſituated in the ſuperior of the corſelet or of the pectus. To obtain a proper view of them, it is neceſſary to cut the body of the inſect in a vertical direction. Over the laſt pair in the pectus there is a ſcaly ſubſtance, in the form of a Y. The ſtalk of this part affords an origin to a muſcle which turns the coxa backward, and is inſerted into its poſterior edge. The muſcle which turns it forward ariſes from the back, and is inſerted by a thin tendon, into its anterior edge.

The muſcle which extends one femur, while it is approximated towards the other, is very conſiderable. It ariſes from the whole branch of the piece in the form of a Y, and is inſerted into the internal edge of the head of the femur. Its antagoniſt is ſituated within the body of the coxa.

The muſcles which extend the two pairs of anterior femora, ariſe from the correſponding dorſal parts, and not from particular internal ſubſtances: the flexors, however, are always ſituated within the body of the coxæ.

The muſcles which turn the coxæ ariſe alſo from the parietes of the corſelet; *viz.* the muſcle which moves it backward, from the dorſal part, and that which moves it forward, from the lateral part. In the water beetles, which, as we have obſerved, have the poſterior coxa conſolidated and immoveable, theſe muſcles ſeem to extend to the femur, which is therefore furniſhed with four, two extenſors and two flexors.

The other orders of inſects have nearly the ſame conformation as the coleoptera.

The muſcles of the tibia are ſituated within the femur. The extenſor, which is ſhort and ſlender, is attached to its external edge (the femur being ſuppoſed extended in the longitudinal direction of the body): the flexor is much ſtronger and longer. It is ſituated on the inner ſide, and in the whole of the ſuperior part.

There are likewiſe two muſcles to each joint of the tarſus: one, which is ſmall, and placed on the ſuperior or dorſal ſurface, acts as an extenſor. The other, which is more conſpicuous, and ſituated on the inferior ſide, acts as a flexor.

For the deſcription of the wings, ſee Entomology.

The muſcles that move the wings are not yet well aſcertained. They appear to be two kinds. Some, which are ſmall and ſhort, are fitted to extend or fold the wings, at the ſame time that they move them to or from the body: the others, which are ſomewhat longer, are calculated to produce the motions of elevation and depreſſion which the wings perform.

The elytra of the coleoptera, orthoptera, and hemiptera, do not appear to aſſiſt in the action of flying, at leaſt they are not moved in the ſame manner by the muſcles of the pectus.

Organs of Senſation.—On comparing together all the nervous ſyſtems, we find only one common part, which is a ſingle tubercle, ſituated at the anterior extremity of the ſyſtem, and always producing two lateral tranſverſe faſciculi or crura, which unite it to the reſt of the ſyſtem. This part appears always to correſpond to that named cerebellum in man. The cerebellum of animals that have red blood and vertebræ, is always preceded by ſeveral pairs of tubercles, forming uſually a larger maſs than the cerebellum itſelf, and united to the reſt of the ſyſtem by two longitudinal faſciculi or crura, which are interwoven in croſſing with thoſe of the cerebellum. This union takes place in ſuch a manner that both are confounded in the common maſs which forms the root of the medulla oblongata, and medulla ſpinalis, and leaves no ſpace between them. Theſe tubercles make what we call the cerebrum.

In the white-blooded animals, or thoſe that have no vertebræ, there are alſo tubercles correſponding to the cerebellum, but they are much ſmaller, removed from each other, and connected with the cerebellum only by ſeparate nervous filaments. The crura of the cerebellum leave a large interval between them, which receives the œſophagus as in a collar.

The two faſciculi, forming the medulla ſpinalis, are intimately united in vertebral animals, and no trace of their ſeparation remains, except a longitudinal furrow before and behind. But, in the animals which have no vertebræ, when this production exiſts, it is formed below the œſophagus by the union of the two crura of the cerebellum. Theſe two faſciculi commonly remain diſtinct throughout the greater part of their length, and are only united at different ſpaces by knots from which the nerves proceed. This production, however, frequently does not exiſt. In ſome animals with white blood, which have no elongation of the medullary ſubſtance, as in the molluſca, the nervous trunks, which are derived from the crura of the cerebellum, enlarge and form ganglia, or two or three nerves unite with each other to produce a common ganglion; and in general it is only from their ganglia that the nerves which are diſtributed throughout the body take their origin.

In thoſe white-blooded animals that have a knotted and double medullary production, that is to ſay, in the inſects, cruſtacea, and certain worms, the nerves all ariſe from the knots or ganglia of the medulla, or from ſome of the anterior ganglia of the cerebellum.

In the red-blooded animals the nerves of the ſpine ariſe from the medulla ſpinalis in two bundles of medullary filaments, which unite after the poſterior bundle has formed a ganglion. They afterwards ſeparate into two trunks, the anterior of which communicates with the great ſympathetic nerve by one or two filaments, and a ganglion is always formed at the place where they unite.

The great ſympathetic nerve, which is conſtantly found in all red-blooded animals, exiſts in none of thoſe with white blood; unleſs we ſhould regard as that nerve, the two nervous cords which unite all the ganglia, and which are commonly called medulla ſpinalis in the cruſtacea, inſects and worms. Were this opinion adopted, a medulla ſpinalis would be no longer attributed to thoſe animals, and the abſence of that production would then be the common character of all the white-blooded claſſes.

Inſtead of having the parts, which repreſent the brain and medulla ſpinalis encloſed in bony cavities, the lower orders of animals have them incloſed in the common cavities, with the other viſcera.

Brain and Nerves of the Cruſtacea.—The cruſtacea, which, in their organs of motion, very much reſemble the other inſects, though thoſe of circulation and reſpiration are exceedingly different, have alſo a ſimilar nervous ſyſtem, at leaſt in the eſſential parts.

In ſuch of the genus cancer as have long tails, the middle part of the ſyſtem is a knotted cord, which extends from one extremity of the body to the other. The ſhort-tailed kind, commonly called *crabs*, have a medullary circle in the middle of the abdomen, whence the nerves of the body proceed like radii.

In theſe animals the brain is placed at the anterior extremity of the ſnout, and conſequently at a conſiderable diſtance from the mouth, which opens under the corſelet. On this account the cords which make the collar of the œſophagus are more elongated than in other animals.

A. *Brain of the common Cray-Fiſh*, (*Aſtacus Fluviatilis*, Fab.)—The brain of this animal forms a maſs which is broader than long, and diſtinctly divided on the ſuperior ſurface into four round lobes. Each of the middle lobes produces an optic nerve from its fore part. This nerve proceeds directly into the moveable tubercle which ſuſtains the eye, and is there dilated and divided into a multitude of filaments, which form a pencil, and unite to all the ſmall tubercles of the eye.

Four other nerves ariſe from the inferior ſurface of the brain; theſe proceed to the four antennæ, and detach ſome filaments to the neighbouring parts. The cords which form the collar, ariſe from the poſterior part of the brain. About the middle of its length, each detaches a large nerve, which extends to the mandibles and their muſcles. Theſe cords unite under the ſtomach in an oblong ganglion, which furniſhes nerves to the different pairs of jaws. On leaving this part, the two cords remain near each other throughout the whole length of the corſelet, where they form five ſucceſſive ganglia, placed between the articulations of the five pairs of feet: each foot receives a nerve from its correſponding ganglion, which penetrates to the extremity of the foot: the nerve of the forceps is the largeſt. The medullary cords extend into the tail, where they are ſo intimately united that it is not poſſible to diſtinguiſh them. They form ſix ganglia, the five firſt of which produce each two pairs of nerves; the laſt produces four, which are diſtributed as radii to the ſcaly fins that terminate the tail.

The hermit crab, (*Pagurus*, Fabr. *Bernhardus*, Linn.)

the tail of which is not covered by articulated ſcales, appears to have much fewer ganglia than the cray-fiſh. We have obſerved only five.

In the *ſquilla*, Fabr. there are ten ganglia, without reckoning the brain: that at the union of the two cords which form the collar, tranſmits nerves to the two forceps, and to the three pair of feet which immediately ſucceed them, and which in theſe animals are ranged almoſt on the ſame tranſverſe line; this ganglion is therefore the longeſt of all. Each of the three following pairs has a particular ganglion. There are afterwards ſix ganglia in the length of the tail, which diſtribute their filaments to the thick muſcles of that part. The brain produces immediately four trunks on each ſide, *viz.* the optic, thoſe of the two antennæ, and the cord which forms the collar. As the antennæ are placed more poſteriorly than the brain, their nerves are directed backward.

B. *In the Common Crab* (*Cancer Mænas*, Linn.)—The brain of the crab reſembles that of the cray-fiſh in its form and ſituation: it alſo furniſhes analogous nerves, but they are directed more towards the ſides, in conſequence of the poſition of the eyes and the antennæ. The medullary cords which form the collar, detach each a nerve to the mandibles, but the cords are prolonged much farther backward than in the cray-fiſh before they unite. They join only in the middle of the thorax, at which place there is produced a medullary maſs of an oval ring-like figure, which is eight times the ſize of the brain. The nerves which proceed to the different parts ariſe from the circumference of this ring. It furniſhes ſix nerves on each ſide to the jaws and the five feet, and there is a ſingle nerve which ariſes from the poſterior part, and proceeds to the tail. This medullary ring may be ſaid to repreſent the uſual knotted cord, but if it has any ganglia they are not viſible.

C. *In the Oniſcus Aſellus.*—The two cords which compoſe the middle part of the nervous ſyſtem in this animal, do not perfectly join. We can diſtinguiſh them throughout the whole of their length. There are nine ganglia, excluſive of the brain; but the two firſt and the two laſt are ſo cloſe together, that the number may be reduced to ſeven.

D. *In Monoculi.*—We know not the nervous ſyſtem of the molucca crab (*limulus gigas*, Fab. *Monoculus polyphemus*, Linn.) In the monoculus apus of Linnæus, however, the indiſtinct nature of that ſyſtem, joined to ſome other peculiarities of organization, would almoſt induce us to claſs the animal with the inarticulated worms. The brain is a ſmall globule, nearly tranſparent, ſituated under the interval of the eyes. The medullary cord is double, and has an enlargement at each of the numerous articulations of the body; but the whole is ſo thin and tranſparent, that the real nature of the cord can ſcarcely be aſcertained.

Brain and Nerves of the Larvæ of Inſects.

A. *Coleoptera.*

1. *Larva of the Scarabæus Naſicornis.*—We ſhall give a particular deſcription of the nerves of this larva, becauſe their diſtribution is eſſentially different from that which takes place in the other coleoptera.

The brain is ſituated under the great ſcale which covers the head immediately above the origin of the œſophagus: it conſiſts of two approximated lobes, which are very diſtinct at the front and back part. Four nerves ariſe from the anterior part, two on each ſide, which are loſt in the cirri and parietes of the mouth.

From the lateral and ſomewhat poſterior parts of the brain, there ariſes a pair of nerves, which, embracing the œſophagus, proceeds inferiorly to form the nervous cord we ſhall preſently deſcribe.

Another pair departs from the inferior ſurface of the brain, or that part which reſts upon the œſophagus: theſe are firſt directed forward; they afterwards turn inward, and proceed above the middle and ſuperior part of the œſophagus, in order to approach each other. When they come in contact, they unite and form a ſmall ganglion, which produces a ſingle nerve; this nerve, continuing to proceed poſteriorly, paſſes below the brain, and accompanies the œſophagus to the ſtomach. It there enlarges again into a ganglion, which furniſhes ſome ſmall nerves that are ſent to the ſtomach, and one more conſiderable, which is continued along the inteſtinal canal, and ſends off, at regular diſtances, lateral filaments, which are loſt in the coats of this tube. This nerve is analogous to that which Lyonet has deſcribed under the name of *recurrent*, in the caterpillar of the *coſſus*.

The medulla ſpinalis, which, as we have ſhewn, is formed by the poſterior pair of nerves of the brain, is very thick at its origin: it forms a large fuſiform ganglion about 0,005 metre long, and half a millimeter broad. Four or five contractions appear on its anterior part, but they are ſo ſlight that they ſeem only tranſverſe furrows. The poſterior part of this ganglion is ſmooth.

From the lateral parts of this large ganglion, which extends very little beyond the third ring of the body, a great number of diverging nervous filaments are produced. Thoſe which are neareſt the head aſcend a little; thoſe which ſucceed them proceed almoſt tranſverſely; and the laſt are directed more and more poſteriorly: the length of each is in proportion to its diſtance from the anterior part of the ganglion. The two moſt poſterior filaments are therefore the longeſt.

2. *Larva of the Stag Beetle* (*Lucanus Cervus*).—The nerves of this larva differ greatly from thoſe of the preceding, although the perfect inſects are ſo nearly allied in genera.

The brain conſiſts of two contiguous and almoſt ſpherical lobes; theſe produce four nerves anteriorly for the antennæ and the parietes of the mouth: two inferiorly, which firſt proceed forward, then turn back, paſs again under the brain, and form a nerve known under the name of *recurrent*. Laſtly, two poſteriorly, which form a collar round the œſophagus, and join underneath, to compoſe the nervous cord of the body. This cord is formed of eight ganglia, which extend to the ninth ring of the body. The diſtances between theſe ganglia are very unequal; they are joined by very ſlender and cloſely approximated nervous filaments. The firſt ganglion, from the head, is very large, and almoſt ſpherical; it is followed almoſt immediately by the ſecond, which is one-half leſs, and which is diſtinguiſhed from it only by a kind of contraction; the firſt produces four pairs of nerves on each ſide; one aſcends to the head, the other three diverge and are loſt in the muſcles of the abdomen, and in thoſe that move the head. The ſecond ganglion, beſides the two nerves that unite it to the third, produces two other nerves, which are alſo directed backward, and loſt in the muſcles of the fourth ring. The third ganglion, and thoſe that follow as far as the eighth, are ſimilar to the ſecond; with this difference, that they are much more diſtant from each other, and that they produce longer filaments, in proportion as they are ſituated more inferiorly. Laſtly, the eighth and ninth ganglia are ſo cloſe together, that they ſeem to form but one, with a ſlight contraction in the middle. This double ganglion produces three pairs of nerves,

nerves, which are much elongated, and extend to the parts near the anus.

3. *Larvæ of the Cerambyx, Hydrophilus, Carabus, and Staphylinus.*—The nerves of theſe larvæ being very ſimilar, it will be ſufficient to deſcribe them in one genus only. We ſhall take for our example the larva of the great diver (*Hydrophilus piceus*).

The brain in this animal is ſituated in the head, above the origin of the œſophagus; it is formed of two lobes which lie very cloſe together. From its anterior part it detaches ſome filaments to the palpi, the antennæ, and the parietes of the mouth. Its lateral parts produce two cords which ſurround the œſophagus, and which are the origin of the nervous cord ſituated inferiorly. It is probable that recurrent nerves alſo ariſe from this inferior part, but we have not yet been able to diſcover them. The chief nervous cord is compoſed of ten ganglia, each of which produce three pairs of nerves that are loſt in the muſcles of the abdomen, and without any diſtinct appearance of their being diſtributed to the inteſtines. This induces us to believe that there is a recurrent nerve. The firſt ganglion is very large; it is prolonged poſteriorly into two nervous filaments, conſiderably removed from each other; the ſecond is almoſt ſimilar, but the third is very near the fourth, which produces only a ſingle filament poſteriorly. All the others, as far as the tenth, preſent no peculiarity. The laſt is divided by a ſenſible contraction; from the firſt portion a ſingle filament ariſes on each ſide, and from the ſecond, three pairs of nerves are detached: thus four pairs of nerves ariſe from this ganglion. The fourth pair is directed to the rudiments of the parts of generation, which are very diſtinct in theſe larvæ in the laſt period of their growth.

4. *Larva of the Water Beetle* (*Dytiſcus Marginalis*).—The brain of this larva is ſpherical, and conſiſts of a ſingle lobe, ſituated in the head above the origin of the œſophagus; its anterior part produces ſome filaments for the mouth; and its lateral parts the two optic nerves; the latter are compoſed of two parts which are very diſtinct as to form. The firſt portion, or that which is next the brain, is of an oval figure, pointed at the extremity which joins the brain: the other extremity is rounded, and produces a ſlender nerve, which goes directly to the eye. It is nearly of the ſame thickneſs throughout the whole of its extent; but it is enlarged at its free extremity into a bulb, from which the nervous filaments of the eye ariſe.

The two cords which embrace the œſophagus are ſhort and thick; they ariſe from the inferior ſurface of the brain, and immediately unite below the œſophagus, in a large ſquare-ſhaped ganglion, which produces anteriorly the nerves of the mandibles, and poſteriorly two cords, which paſs from the head into the corſelet. There is a greater diſtance between this firſt ganglion of the nervous medulla and the ſecond, than between any of the others. It is more than double that which exiſts between the two next ganglia. The ſecond ganglion is round; it produces two pair of nerves laterally; the anterior for the muſcles which act upon the head, the poſterior for thoſe which move the anterior feet. There are two cords poſteriorly, which are directed into the breaſt. The third ganglion is ſimilar in every reſpect to the ſecond; it furniſhes nerves to the intermediate pair of feet. The fourth ganglion is alſo produced by the two cords which come from the preceding; it is ſituated on the union of the abdomen with the breaſt; it is more broad than long. Laterally it produces two pair of nerves, which run tranſverſely parallel, and are loſt in the muſcles. The other eight ganglia are placed cloſe behind each other, and the ſpace between them is ſo ſmall, that we can ſcarcely perceive the two nervous filaments which unite them; they alſo decreaſe in thickneſs, without diminiſhing in breadth, as they extend poſteriorly. They all furniſh laterally a pair of very long nerves, which float in the abdomen, and for the moſt part terminate in the muſcles that move the wings. One pair, however, proceeds to the rudiments of the parts of generation.

B. *Orthoptera and Hemiptera.*—The nerves of the larvæ of orthoptera and hemiptera preſent no ſenſible difference from thoſe we obſerve in the perfect inſects. It will be ſufficient, therefore, to deſcribe the nerves of the latter.

C. *Hymenoptera.*—In the larva of the ſaw-fly (*Tenthredo*, Linn.), which has a large head furniſhed with eyes, the brain is very broad and ſhort; it ſeems to form four bulbs of equal magnitude, and nearly ſpherical; the two external ſerve as the baſe of the optic nerves, which are ſlender, and which enlarge a little at their other extremity. The firſt ganglion is produced by two very ſmall nerves, which ariſe from the inferior ſurface of the brain, and which, after having embraced the œſophagus, unite under the firſt ring of the body; it furniſhes filaments to the muſcles of the feet, and terminates poſteriorly in two other nerves, which, at the diſtance of one line, produce a ſecond ganglion, and ſo on in ſucceſſion; the nervous cord is in this manner formed of eleven ganglia, without reckoning the brain; the farther the ganglia are removed from the head, the more they diminiſh in thickneſs; they are all nearly of a round form.

D. *Neuroptera.*—In the larva of the lion-ant (*Myrmeleon formicarius*), the nervous ſyſtem has ſome relation to that of the larva of the dipterous inſects which we ſhall afterwards deſcribe.

There is a brain ſituated in the head; it produces nerves analogous to thoſe we have already pointed out in the other larvæ. The nervous medulla conſiſts, in the firſt place, of two ganglia, which are compoſed of two lobes, ſituated cloſe together; theſe two firſt ganglia are ſeparate from the others, and contained in the part correſponding to the feet, or in the thorax. The remainder of the nervous medulla is encloſed in the abdomen; it conſiſts of eight ganglia, placed in an exceedingly cloſe ſeries, and each formed of two lobes; the firſt is nearly double the ſize of the other ſeven. This ſucceſſion of ganglia appears to the eye like the extremity of the tail of a rattle-ſnake; the laſt is round; the others are more broad than long. All theſe ganglia furniſh nerves to the muſcles. It is probable that this diſpoſition and approximation of the ganglia have a relation to the changes which take place in the inſect at the moment of its metamorphoſis, as its abdomen then occupies ſix times the ſpace it does in the larva ſtate.

In thoſe larvæ of neuroptera, which are nearly as long as the perfect inſect, we find that the ganglia are ſeparated in the uſual manner.

The larva of the ephemera has eleven ganglia, without including the brain, which furniſhes two large optic nerves. There are three ganglia in the thorax, and ſeven in the abdomen: the firſt ſix, reckoning all the ganglia, furniſh more nerves than the five laſt.

The larvæ of the dragon-flies have a ſmall two-lobed brain, which produces optic nerves, larger or ſmaller according to the ſpecies. The genus aëſhna has them the largeſt. The reſt of the nervous ſyſtem forms a ſeries of ganglia of different ſizes. In the aëſhna, the corſelet contains ſix, the two laſt of which are the largeſt of all. There are ſeven ſmall and equal ganglia in the abdomen.

E. *Lepidoptera.*—The nervous ſyſtem of caterpillars conſiſts of a ſeries of thirteen principal ganglia, which furniſh filaments to all other parts of the body. The firſt of theſe thirteen ganglia is ſituated in the cavity of the head ; it lies above the œſophagus, and ſupplies the place of the brain : it appears formed ſuperiorly by the union of two round tubercles, inferiorly it is concave, and correſponds to the convexity of the œſophagus. This ganglion communicates with the reſt of the nervous cord by two thick filaments, which embrace the œſophagus, and which are united below it to the anterior and lateral part of the next ganglion ; it beſides produces eight pairs of nerves.

The firſt partly unites with other filaments ; produces ſome for the œſophagus, and forms ſeveral remarkable ganglia below the upper lip. The largeſt and moſt poſterior, which Lyonet has named the *firſt* frontal ganglion, is prolonged poſteriorly into a thick recurrent nerve, which is continued the whole length of the body, near the back ; this recurrent nerve furniſhes filaments to the œſophagus and its muſcles ; it penetrates into the dorſal veſſel, and it afterwards re-appears, and glides along the œſophagus as far as the ſtomach. This nerve produces, at certain diſtances, very ſolid filaments, which keep the œſophagus attached to the ſkin of the back.

Beſides the recurrent nerve we have juſt noticed, ſeveral filaments are furniſhed by the poſterior frontal ganglion to the muſcles of the œſophagus, and two to the *ſecond* frontal ganglion ; the latter alſo detaches ſeveral filaments to the œſophagus, and, in particular, a very remarkable one, which, by a ſudden englargement, conſtitutes the *third* frontal ganglion. This ganglion likewiſe affords ſeveral filaments to the œſophagus.

The ſecond pair of the brain appears chiefly intended for the antennæ, though it furniſhes ſeveral filaments to the neighbouring parts. The third pair terminates particularly in the antennæ, and the muſcles which move them. The fourth pair is proper to the eye of each ſide ; it accompanies the air-tube which goes to that part, and is divided into ſix branches, that penetrate into the ſix eyes, which, by their union, form that of the caterpillar. The fifth is directed a little backward, where it divides into two branches ; one poſterior for the adductor muſcles of the jaw ; the other anterior, which is loſt in the membranes that cover the frontal ſcales. The ſixth and ſeventh pair unite to form a ganglion from which ſeveral filaments are detached, to the œſophagus and its muſcles. Finally, the laſt pair of the brain is entirely loſt on an air-tube.

But beſides theſe nerves produced by the firſt nervous ganglion, ſeveral others are detached from it, which we ſhall briefly notice. In the firſt place, we obſerve, that it furniſhes ſeveral filaments to the dorſal canal : it afterwards gives origin to a pretty long filament, which terminates on the air-veſſels, between the ſecond and third ganglion. Laſtly, it produces a nervous ring, which embraces the œſophagus inferiorly like a girth, and ſupplies it with ſeveral filaments. The ſecond ganglion is intimately united with the third, and is diſtinguiſhed from it only by a contraction. The nerves which proceed from the anterior part appear to be produced by the ſecond ganglion, and thoſe which ariſe from the poſterior part, ſeem to belong to the third.

Beſides the two filaments which form the collar round the œſophagus, and which unite the firſt to the ſecond ganglion, the latter has four pair of very diſtinct nerves. The moſt anterior pair is ſent forward to the mouth, but in its courſe it divides into two branches : one terminates in the tongue and the adjacent parts ; the other branch proceeds to the lateral parts, where it ſub-divides, to ſupply the mandible, the jaw, and upper lip, communicating, at the ſame time, with the firſt ganglion, and with the ſecond frontal. The ſecond pair proceeds to the jaw, but detaches a number of filaments to the muſcles of the neighbouring parts. The third pair is deſtined for the ſpinning apparatus ; in its courſe it gives filaments to the ſilk-veſſels and muſcles of the head. The fourth pair ariſes near the contraction, which indicates the union of the two ganglia, between the head and the firſt ring ; it is loſt in the fat, in the ſkin of the neck, and in the muſcles inſerted into the head.

The third ganglion, which, as we have obſerved, is united to the ſecond, produces only three pairs of nerves : the poſterior is merely the continuation of the nervous trunk of the other two pairs ; the anterior is entirely loſt in the muſcles and the ſkin ; the intermediate pair ſupplies that part alſo ; but it is diſtributed chiefly to the muſcles, which move the articulations of the leg.

We have already ſtated, that each ganglion communicates with that which precedes, and that which follows it by two filaments that are diſtinct from their origin, and are the bifurcation of a ſingle trunk. The middle of this bifurcation, from the third to the eleventh ganglion, produces a ſmall nerve, which Lyonet has named the *ſpinal frænum :* this ſingle nerve is ſituated in the middle line ; it preſently divides into two branches, which follow the diviſions of the air-tubes, and penetrate with ſome of them into the longitudinal veſſel.

The fourth and fifth ganglia produce the ſame number of nerves, the diſtribution of which is alſo nearly ſimilar ; their anterior pair proceeds to the muſcles, and to the ſkin of the rings to which it correſponds ; the intermediate pair furniſhes, more particularly, filaments to the muſcles of the leg.

The ſixth ganglion, which correſponds to the fourth ring of the body, alſo furniſhes two pair of nerves, which are loſt in the muſcles and the ſkin.

The nerves of the five following ganglia are diſtributed nearly in the ſame manner.

The twelfth ganglion, and the thirteenth, which is the termination of the nervous cord, are very cloſe to each other, though diſtinct. The diſtribution of the nerves, produced by the firſt, preſents nothing remarkable. Thoſe furniſhed by the ſecond are very long, being ſent to the laſt rings, in the ſkin and muſcles of which the firſt pair is partly loſt. The ſecond pair is only ſubdivided when it has reached the firſt ring ; it there produces a plexus, from which a number of filaments are detached to the great inteſtine. The trunk appears to end on the parietes of the rectum towards the anus.

F. *Diptera.*—The nerves of the larva of the ſtratyomis have ſome reſemblance to thoſe of the larva of the ſcarabæus naſicornis.

The brain is formed of two lobes, placed cloſe together, and almoſt ſpherical ; it is ſituated above the œſophagus, on a level with the ſecond ring of the body. A number of ſmall nervous filaments ariſe from its anterior part, and are diſtributed to the parietes of the mouth, to the mandibles, and to all the adjacent parts. Theſe nerves are very diſtinct, particularly thoſe which are removed from the middle line. The poſterior part of theſe two lobes ſends off two thick branches which embrace the œſophagus, and form the origin of the nervous medulla. This nervous cord is very ſhort, and its diameter is one-half leſs than that of the brain ; it conſiſts of eleven ganglia placed very near each other, each of which produces one pair of nerves.

Theſe nerves proceed directly backward. Swammerdam has erroneouſly repreſented this cord as twiſted, like the tail of a ſcorpion, and producing nerves on the left ſide only. It is true, that thoſe which ariſe from the right ſide are parallel to the cord, while thoſe of the left ſide remove farther from it. The ganglia, thus approximated, are eleven in number, and in a ſtraight direction; they produce long nerves, which are loſt in the muſcles.

The nerves of the cheeſe-worm (*Muſca putris*, Linn.) are diſtributed in a very curious manner. The brain is ſituated immediately above the origin of the œſophagus, behind the head; it is very large in proportion to the reſt of the body; it is rounded poſteriorly, and notched anteriorly, as if it were formed of two lobes.

A pair of nerves ariſe from the anterior part of the brain, proceed forward, and are diſtributed to the mouth, and even to the parietes of that cavity. It ſhould be remarked, that theſe nerves experience a very conſpicuous enlargement previouſly to their diſtribution.

Poſteriorly the brain preſents an aperture, which affords a paſſage for the œſophagus: the nervous part, ſituated on its ſides, may be regarded as the cords which produce the medulla, and all below the œſophagus as the medulla itſelf.

Two pairs of nerves ariſe from the origin of the nervous medulla; theſe are directed forward, and principally diſtributed to the viſcera, and to ſome of the muſcles of the anterior rings. The third pair of nerves which this medulla produces is the moſt remarkable; it comes from the part which nearly correſponds to the third ganglion; we ſay nearly, becauſe in this inſect the ganglia are ſo cloſe to one another, that the medulla ſeems to form only one piece on the ſurface of which we merely perceive twelve tranſverſe wrinkles, which indicate the number of ganglia. This third pair extends almoſt tranſverſely. At a certain diſtance from its ſeparation it ſwells into a ganglion, and then divides into ſeveral filaments; theſe are the ganglia which Swammerdam ſuppoſes are intended for the muſcles of the wings, when they ſhall exiſt in the perfect inſect.

Another pair of nerves, which go to the muſcles of the body, ariſe from each of the other contractions; but they require no particular remark.

Brain and Nerves of Perfect Inſects.

A. *Coleoptera.*

1. *In the Stag-beetle* (*Lucanus Cervus*).—We find in this inſect, as in its larva, a brain compoſed of two approximated ſpherical lobes, ſituated above the œſophagus; its anterior part produces two pair of nerves, which terminate in the palpi and other parts of the mouth. There is probably a recurrent nerve, but our reſearches have not yet diſcovered it.

There are two ganglia on the lateral parts of the brain, which are almoſt as large as each of the lobes. In their form they reſemble a pear, and reſt upon the brain by their baſe; they are prolonged tranſverſely into a large nerve on each, chiefly intended for the eye. Before the nerve arrives at that part, we obſerve it detach a ſlender filament, which enters into the great mandible; then, more externally, another filament which enters into the cavity of the antennæ; laſtly, the nerve itſelf, having reached the eye, ſwells again into a bulb, and produces a number of nerves, which we ſhall deſcribe when we treat of the organ of viſion.

Poſteriorly the brain produces two very long and ſlender nerves which accompany the œſophagus to the point where the head unites to the thorax, immediately above the articular condyle. The two nerves ſituated above the œſophagus, then, produce a ganglion of a long oval form, from which ſeveral nervous filaments are detached to the muſcles that move the mandibles, and thoſe that act on the head. This ganglion terminates poſteriorly in two parallel nerves, which proceed to the middle of the thorax, above the origin of the two pair of feet, and there form a ſecond ganglion of an hexagonal figure; this ganglion furniſhes filaments to the muſcles of the feet, and likewiſe terminates poſteriorly in two nerves, which extend above the union of the corſelet, with the pectus; they there unite and form a third ganglion, which is creſcent-ſhaped, with the convexity poſterior: two other nerves proceed from this convexity, which almoſt immediately produce another ganglion of the ſame form, but ſmaller. This ganglion gives origin to five nerves: two lateral, deſtined to the muſcles of the intermediate feet, into the coxæ of which we obſerve them enter: poſteriorly two, which are ſlender, and diſtributed to the muſcles of the hind feet and the wings. The fifth is ſituated in the middle line; it is alſo thicker, it ſwells almoſt immediately into an oval-ſhaped ganglion, which is divided poſteriorly into two exceedingly ſlender filaments. Theſe filaments, which paſs into the abdomen, form a kind of bridge in the breaſt, in which they occupy the middle line, and leave between them the muſcles of the feet and wings of either ſide.

2. *In the Scarabæus Naſicornis.*—With reſpect to the nerves, this inſect differs in the perfect ſtate from the deſcription we have given of its larva. The optic nerves, which are very diſtinct and large, proceed to the eye, into which we obſerve them enter by a multitude of filaments when we make a horizontal ſection of that organ.

The nervous cord preſents a very conſpicuous difference. In the larva there is only a ſingle ganglion; but the perfect inſect has ſeveral, which are very diſtinct. The firſt is ſituated above the condyle; it proceeds from the two poſterior filaments of the brain, and is diſtributed to the muſcles which move the head on the corſelet. Its poſterior part produces two filaments, which paſs into the breaſt, where they unite towards the middle part, and form a triangular ganglion; from the ſides of which three pairs of nerves ariſe, and are diſtributed to the muſcles. Its poſterior angle detaches two parallel nerves, which proceed into the breaſt, where they form a third and a fourth ganglion, ſituated very near each other, and apparently divided into two lobes by a longitudinal furrow. All the other nerves of the body depart from thoſe two ganglia by an irradiation, preciſely in the ſame manner as in the larva.

3. *In the Water Beetles* (*Dytiſcus*) *and the Ground Beetles* (*Carabus*).—The nervous ſyſtem is entirely ſimilar in theſe inſects. The brain is formed of two large hemiſpheres, ſeparated from each other by a longitudinal furrow. The anterior part produces the nerves of the mouth, and the lateral parts thoſe of the eyes and antennæ. The nerves of the eyes are ſhort, and differ greatly from thoſe of the ſtag beetles; they are of a pyramidal form: their baſe correſponds to the eye, and their apex to the brain. We have not obſerved any recurrent nerves.

The two filaments which produce the nervous cord depart from the brain, not poſteriorly, but inferiorly, on the ſide of the optic nerves: they are very ſhort, as they paſs immediately under the œſophagus. They furniſh ſome filaments to the muſcles and the œſophagus. The firſt ganglion they form lies under a kind of bridge, formed of horny ſubſtance, which is ſituated in the middle of the head, and which affords a point of attachment to the muſcles of the jaws; it is of an elongated and quadrangular figure, and occupies almoſt the whole ſpace that correſponds to the condyle above which it is placed. It is terminated poſteriorly by two filaments which proceed in a parallel direction, and form a ſecond ganglion in the middle part of the corſelet. This ganglion furniſhes nerves to the muſcles of the anterior feet. We obſerve them enter into the cavity of the coxæ. The third ganglion appears bilobed, or formed of two oval bulbs, the union of which is marked by a longitudinal furrow. This ganglion is ſituated longitudinally above the anterior inferior edge of the breaſt. It ſends filaments to the muſcles of the intermediate feet. The fourth ganglion is very near the preceding; it is of a roundiſh form, and is diſtributed to the muſcles of the poſterior feet and the wings. The ſpace between the fifth and ſixth ganglion is very ſmall: their form is round; and they furniſh filaments to the muſcles that move the abdomen on the breaſt. The remainder of the medullary cord is formed by a ſeries of five ganglia, ſituated ſo cloſe to one another, that they appear to the naked eye to form only one; but with a glaſs they may be obſerved very diſtinctly. We even perceive the two filaments produced by each to form the ſucceeding ganglion. The fifth preſents a tranſverſe furrow, which ſeems to indicate the union of two ganglia. The end of the medulla appears to float in the abdominal cavity, but above the inteſtines.

4. *In the Great Diver* (*Hydrophilus Piceus*, Linn.)—The brain of this inſect, which is ſituated in the head, and above the origin of the œſophagus, conſiſts of two ſpherical bulbs cloſely united. The lateral parts give origin to the optic nerves which proceed towards the eyes without changing their diameter, but which terminate there by a triangular bulb that produces a vaſt number of filaments externally.

The anterior part of the brain detaches ſome filaments intended for the parietes of the mouth. We alſo remark, at the ſame place, a ſmall ſpherical ganglion, which appears to belong to the recurrent nerve that accompanies the œſophagus.

Two filaments, which ſhould produce the medullary cord, ariſe inferiorly: they embrace the œſophagus at their ſeparation, unite immediately below it, and again, in the cavity of the head, to form a ſmall ganglion, which furniſhes nerves for the muſcles of the mandibles and the palpi. Two nervous cords are detached from the poſterior part of this firſt ganglion. Almoſt immediately after their origin, they paſs under a horny arch, which is produced by the internal ſurface of the ganache. We obſerve that they re-appear poſteriorly, and proceed into the corſelet. They form a ſecond ganglion exactly in the middle of the corſelet; its figure is quadrangular. The anterior and poſterior angles produce the nerves of the medulla, and the lateral thoſe intended for the muſcles of the anterior feet. The interval included between the ſecond and third ganglion of the medulla is very great. The third ganglion correſponds to the inſertion of the intermediate feet: it is large, and of a round form; it furniſhes nerves to the wings, and to the intermediate pair of feet. Poſteriorly it produces two cords, which, at the diſtance of about half a line, ſwell and form a fourth ganglion, almoſt as large as the preceding. This ganglion detaches, from its inferior part, a number of filaments for the muſcles of the poſterior feet, which are ſpecially appropriated to ſwimming. Two other very ſhort cords produced by the poſterior part of this ganglion ſwell into a fifth, which is one-half leſs than the former, and which furniſhes a ſingle cord poſteriorly. This cord paſſes into a kind of longitudinal groove, formed above the horny appendix, that furniſhes attachments to the muſcles of the coxæ. A ſixth ganglion is ſituated at the poſterior and wide part of this appendix: at a certain diſtance, and exactly above the union of the abdomen with the breaſt, a ſeventh appears. Theſe two ganglia produce only one pair of nerves, which are diſtributed to the muſcles.

There are only two ganglia in the abdomen; one correſponds to the middle part of the ſecond ring; the other, which is the laſt and ninth, is ſituated above the union of the ſecond ſegment with the third. The laſt ganglion but one is in every reſpect ſimilar to the two preceding; but the ninth is one-half larger, and produces poſteriorly four pair of nerves, which are diſtributed on both ſides to the parts of generation.

B. *Orthoptera.—In the Cockroach* (*Blatta Americana.*)—The brain of this inſect is compoſed of two lobes, ſeparated by a very diſtinct notch anteriorly. The optic nerves ariſe on the ſides, and its anterior part detaches ſome filaments to the parietes of the mouth, and to the inſtruments of manducation.

The nervous cords which form the medulla ariſe from its inferior ſurface. They proceed directly downward, and cloſely embrace the œſophagus. They afterwards proceed in a parallel direction, but very diſtinct from each other, towards the corſelet. When they reach its middle, they form a very large ganglion, which produces three pairs of nerves laterally, and one poſteriorly. The firſt lateral nerves aſcend obliquely towards the head, and furniſh filaments to the muſcles that move it on the thorax, and which act on the antennæ and the parts of the mouth. The others are diſtributed to the muſcles of the firſt pair of feet.

The poſterior nerves proceed in a parallel direction backward. At the middle of the pectus they produce a ſtill more conſiderable ganglion than the ſecond, which furniſhes laterally nerves to the intermediate and poſterior feet, as well as to the muſcles of the wings. It alſo ſends off two cords poſteriorly, which, by their union at the junction of the abdomen and the breaſt, form a fourth ganglion, ſituated on a projecting horny ſubſtance to which the muſcles of the coxæ are attached.

After this fourth ganglion there is only a ſingle nerve, which has, at certain ſpaces, ſmall enlargements. Five of theſe ſwellings may be counted. Each produces a pair of nerves for the muſcles of the rings of the abdomen: the firſt is the largeſt, and furniſhes beſides two nerves which ramify in the parts near the anus.

In the Great Green Graſshopper (*Gryllus Viridiſſimus*, Linn.)—The brain is ſituated in the head above the œſophagus: it conſiſts of two lobes, which have the form of pears, united at their baſe, and prolonged at the other extremity into an optic nerve for the eye of each ſide. The anterior part alſo produces two nerves of a pyramidal form, the baſe of which reſts upon the brain. Some filaments ariſe from the apex of the pyramid, which are loſt in the mandible, the jaw and its galea, as well as in the upper lip.

Between theſe two anterior nerves we obſerve a ſmall ganglion, which is produced by the union of the two filaments of the inferior ſurface of the brain. This is the recurrent nerve which follows the inteſtinal canal. Poſteriorly, and a little inferiorly, we obſerve the origin of the two cords which form the nervous medulla. They embrace the œſophagus, below which they are immediately directed, and form a ganglion. This firſt ganglion is protected and covered by a kind of horny bridge of a reddiſh colour. It furniſhes nerves to the muſcles of the mouth, and to thoſe of the head within which it is incloſed. Poſteriorly it produces two long nervous cords, which penetrate into the corſelet. Theſe two cords unite about the middle of the thorax before the appendix, which gives attachment to the muſcles of the coxæ and the anterior pair of feet. At this union they form a large a large bilobed ganglion, of an irregular quadrangular figure, the ſides of which produce ſeveral filaments for the muſcles of the anterior feet.

The poſterior part of this ſecond ganglion furniſhes two filaments, which penetrate into the breaſt. The ſolid appendices of the coxæ, which afford inſertions for the muſcles, paſs between theſe two filaments. They form a third ganglion, which correſponds to the middle ſpace included between the two intermediate feet. This ganglion ſends nerves to the muſcles of the wings and the feet.

The fourth ganglion is alſo contained in the breaſt. It is ſituated before and between the poſterior pair of feet. It is produced by two nervous cords from the preceding ganglion; and furniſhes two poſteriorly, which are ſo cloſe to each other, that they appear to the naked eye to make only one cord. This nerve is received and contained in a kind of groove formed above the triangular piece, which affords an attachment for the muſcles of the feet.

The other ganglia, which are all ſituated in the abdomen, are ſix in number. They are, the laſt excepted, of the ſame ſize and form, placed at equal diſtances, and produced by two ſimilar and cloſely approximated cords. Each furniſhes two pair of nerves for the muſcles of the abdominal rings.

The laſt ganglion of the medulla is one-half larger than the five preceding. It is ſituated below the parts of generation, to which it is diſtributed by four pair of filaments.

In the Mole-cricket (*Acheta Gryllo-talpa.*)—The brain of this inſect is alſo compoſed of two rounded lobes, which are particularly diſtinct at the poſterior part. We can clearly perceive the origin of the nerves of the palpi, of the antennæ, of the ſmooth eyes, and of the eyes properly ſo called. In general the nerves of the principal medulla are ſimilar to thoſe we have deſcribed in the cock-roach. The two firſt ganglia are produced by two nerves. The firſt, which is in the corſelet, ſupplies the muſcles of the head, breaſt, and anterior feet. The ſecond, which is larger, and in the breaſt, gives filaments to the muſcles of the wings, and of the intermediate and poſterior feet. It alſo ſends two nerves poſteriorly, which produce the abdominal ganglion. The cord then becomes ſingle and flat, like a ribband, and contains only four ganglia, occurring at differeat diſtances. Each produces two pairs of nerves, which are directed poſteriorly, and diſtributed to the muſcles. The firſt correſponds to the middle part of the firſt abdominal ring; the ſecond to the third, the third to the fifth, and the laſt to the ninth.

This laſt ganglion is the moſt remarkable of all. It is of an oval ſhape, and produces, from the whole of its circumference, nerves which are diſtributed to the neighbouring parts. Two, which are longer than the others, diverge as they proceed backward, and thus repreſent a bifurcation of the medullary cord. Theſe branches furniſh filaments to the parts of generation.

C. *Hemiptera.—In the oval Water Scorpion* (*Nepa Cinerea*, Linn.)—The nervous ſyſtem of this inſect conſiſts of three ganglia. The firſt, which ſupplies the place of the brain, is ſituated in the head. It is formed of two approximated lobes. Theſe lobes are pyriform, and touch each other at their baſe. Their ſummits are directed obliquely forward towards the eyes, in which they terminate, and thus anſwer to the optic nerves by their anterior extremities. The middle and anterior part of theſe lobes alſo produce ſome filaments for the parts of the mouth. Poſteriorly, the brain detaches two cords, which embrace the œſophagus as they paſs below it. They unite at the origin of the breaſt in a tetragonal ganglion: each of the angles of which produces or receives ſeveral nerves. The anterior receives the two cords which come from the brain; the poſterior, the two which are the continuation of the medullary cord. Each lateral angle produces a faſciculus, compoſed of four nerves, which are directed to the muſcles of the breaſt and anterior feet. We obſerve one of them enter into the cavity of the coxa.

The two nerves produced by the poſterior angle of the ſecond ganglion proceed in a parallel direction backward. Having arrived in the breaſt above the horny appendix, to which the muſcles of the coxæ of the intermediate and poſterior feet are attached, they ſwell into a large round ganglion, conſiderably more voluminous than the brain. A vaſt number of nerves are detached from the edges of this ganglion, like ſolar rays. The two moſt remarkable filaments are exceedingly long and ſlender. They extend from the breaſt nearly as far as the anus: we have obſerved them to terminate by three minute branches in the parts of generation of the male, furniſhing, at the ſame time, ſome filaments to the adjacent parts. All the other filaments, which proceed from this third and laſt ganglion, are deſtined to the muſcles. We can very plainly diſtinguiſh thoſe that belong to the middle and intermediate feet, as they are ſomewhat larger than the others.

D. *Lepidoptera.—In the Zig-zag Moth* (*Phalæna Diſpar*, Linn.)—The brain in this ſpecies is almoſt ſpherical. We, however, perceive a longitudinal furrow on the middle line. Its anterior part produces ſome exceedingly ſlender nerves. There are two large optic nerves on the ſides, which proceed into the concavity of the eye, where they terminate by a bulb, which produces a great number of filaments.

The œſophagus paſſes immediately behind the brain, through a ſmall triangular interval, the poſterior ſides of which are formed by the two cords of the medulla. Theſe cords afterwards unite, and proceed in the form of a ſingle trunk, on the middle part of which we perceive only a longitudinal furrow. Arrived in the corſelet, it forms a ganglion, the ſurface of which is reddiſh. This ganglion produces two nerves poſteriorly, which leave between them an interval that affords a paſſage for the horny appendices to which the muſcles of the coxæ are attached. The two cords again unite behind theſe appendices in the ſame cavity of the breaſt, and produce a much larger ganglion, the lateral parts of which furniſh nerves to the muſcles of the wings and feet. It is prolonged poſteriorly into a ſingle cord, which again enlarges when it arrives above the articulation of the breaſt with the abdomen into a third ganglion.

It ſhould be remarked, that this large ganglion, which has the form of a heart, is the only one, beſides the brain, of a completely white colour. All the others exhibit darker ſhades, and we obſerve in them, when viewed by a glaſs, reddiſh points more or leſs elongated and ſinuous, that reſemble the blood-veſſels of injected glands.

The third ganglion is prolonged into a ſingle cord, which produces a fourth ganglion above the firſt ring of the abdomen. The latter, as well as thoſe that ſucceed it, detach on each ſide a long ſlender nerve which paſſes under the muſcular fibres, preciſely in the ſame manner as the threads of the woof paſs through the warp in cloth. Their direction is completely tranſverſe. The fifth ganglion does not differ from the preceding. It is prolonged into a ſingle cord, upon which we can ſtill very diſtinctly perceive the longitudinal furrow. It is ſituated in the middle part of the third ring of the abdomen. The ſixth ganglion is, in every reſpect, ſimilar to the preceding; it is placed in the middle of the fourth ring. Finally, the ſeventh and laſt ganglion is much larger than thoſe that precede it in the abdomen. It is of an oval form, and ſituated upon the lunula that terminates the fifth abdominal ring poſteriorly. Beſides the nerves intended for the muſcles of the fifth ring, which are detached from this ganglion in two diſtinct parts, it produces four other pairs poſteriorly. Theſe nerves appear to be diſtributed to the parts of generation, and to the muſcles of the laſt abdominal rings, which, in the female, are elongated like a tail to aſſiſt in laying eggs.

E. *Neuroptera.*—The inſects with naked wings, that is to ſay, the hymenoptera, neuroptera, and diptera, which have frequently very large eyes, have alſo the optic nerves of a proportional ſize. This is particularly obſervable in the dragon flies. Their brain is formed of two very ſmall lobes; but their optic nerves are dilated into the form of two large plates, which have the figure of a kidney, and which is ſpread upon all the inner ſurface of the eye next the head. The remainder of their medullary cord is exceedingly ſlender, and furniſhed with twelve or thirteen ſmall ganglia, the laſt of which is, as uſual, connected with the parts of generation.

F. *Hymenoptera.*—The brain of the bee is ſmall, and divided into four lobes. It produces immediately the nerves which are diſtributed to the different parts of the mouth, and the two large optic nerves which are dilated and applied behind each eye as in the dragon flies. There are afterwards ſeven ganglia, three of which are in the corſelet, and four in the abdomen. The nerves of the laſt chiefly ſupply the parts of generation.

G. *Diptera.*—The apiform fly (*Muſca tenax*, Linn.) has a ſmall brain, formed of two lobes, which are ſituated very cloſe together, but diſtinguiſhed by a longitudinal furrow; the anterior part produces a large nerve, which is afterwards diſtributed to the antennæ and the proboſcis.

The optic nerves are very thick, cylindrical, and equal in diameter to the length of the brain, on the lateral parts of which they reſt; they terminate at their extremities in very large bulbs, which correſpond to the breadth of the eyes.

The firſt ganglion of the medulla is produced by two cords, which come from the poſterior part of the brain, and embrace the œſophagus as a collar; it is very ſlender, and ſituated in the breaſt; it furniſhes a pair of filaments to the muſcles of the anterior feet.

The ſecond and the following ganglia, in all three in number, are united to each other merely by a ſingle cord. The laſt ganglion is one-half larger than that which precedes it. Poſteriorly it produces eight or nine filaments, which are intended for the parts near the anus; the firſt of the three is ſituated in the breaſt, where it furniſhes nerves for the muſcles of the wings and the feet; the other two ganglia are in the abdomen; the laſt but one is placed above the union of the third ring with the fourth; and the laſt on the interior and inferior edge of the fifth ring.

In the hornet-fly (*Aſilus crabroniformis*) we alſo obſerve a ſingle cord uniting the abdominal ganglia, which are ſix in number.

The brain is ſimilar to that of the ſyrphus; but the bulbs, formed by the optic nerves, are ſtill broader, in proportion to the extent of the eyes they have to inveſt.

H. *Gnathaptera.*—In the great ſcolopendra (*Scolopendra morſitans*) the brain has a very ſingular form: it is, as uſual, compoſed of two lobes, which are almoſt ſpherical; it produces laterally the optic nerves, which are very ſhort, and may be obſerved to divide long before they reach the eye. The filaments are four in number; but two nerves ariſe anteriorly, which are ſo very thick, that they appear a part of the brain, to which they are equal in diameter. Theſe nerves are particularly intended for the antennæ, into which we obſerve them enter, and in which they may be followed on account of their magnitude.

The two cords which embrace the œſophagus proceed directly downward, and form a large ganglion at the union of the firſt ring with the head. The firſt ganglion produces two nerves poſteriorly, and ſeveral towards the ſides. A ganglion, preciſely of the ſame ſhape, is placed above each of the articulations: thus there are, in all, twenty-four very diſtinct ganglia; the laſt of all is ſmalleſt, neareſt the preceding, and ſeems to float in the abdomen; each detaches three pairs of nerves; one which aſcends towards the head, a ſecond which runs tranſverſely; both theſe are diſtributed to the muſcles of the abdomen: the third deſcends, and then proceeds backwards and upwards; it furniſhes filaments to the lateral muſcles, and to thoſe of the back.

Organs of Senſe.—We have very little to obſerve on this ſubject, in addition to what will be found in the article ENTOMOLOGY, under the diviſions, *Organs of Taſte, Palpi, Olfactory Organs, Eyes, Stemmata, Organs of Hearing.*

Few ſubjects in comparative anatomy and phyſiology have given riſe to more various and contradictory opinions, than the organs of ſenſe in ſome claſſes of animals. Much miſunderſtanding on this point has clearly ariſen from the inconſiderate application to animals, of inferences drawn from the human ſubject. Thus, it has been ſuppoſed that thoſe which poſſeſs a tongue, muſt have it for the purpoſe of taſting; and that the ſenſe of ſmell muſt be wanting, where we are unable to aſcertain the exiſtence of a noſe. Obſervation and reflection will ſoon convince us, that the tongue, in many caſes (in the ant-eaters among mammalia, and almoſt univerſally in birds) cannot, from its ſubſtance and mechaniſm, be conſidered as an organ of taſte; but muſt be ſubſervient merely to the ingeſtion and deglutition of the food. Again, in ſeveral animals, particularly among inſects, an acute ſenſe of ſmell ſeems to exiſt, although no part can be pointed out in the head, which analogy would juſtify us in deſcribing as a noſe.

However univerſally animals may poſſeſs that feeling, which makes them ſenſible to the impreſſions of warmth and cold, very few poſſeſs, like the human ſubject, organs excluſively appropriated to the ſenſe of touch, and expreſsly conſtructed for the purpoſe of feeling, examining, and exploring the qualities of external objects. This ſenſe appears, according to the preſent ſtate of our knowledge, to exiſt only in three claſſes of the animal kingdom; *viz.* in moſt of the mammalia, in a few birds, and probably in inſects. All the obſervations and inveſtigations of the ſtructure of the antennæ, thoſe peculiar organs which exiſt univerſally in the more perfect inſects; and of the uſe which theſe animals generally apply them to; lead us inevitably to the concluſion, that they really are, what their German name implies (Fühlhorner; the literal tranſlation of which is feeling horns) proper organs of touch; by which the animal examines and explores ſurrounding objects. Such organs are particularly neceſſary to inſects, on account of the inſenſibility of their external coat, which is generally of a horny conſiſtence; and alſo from their eyes being deſtitute in moſt inſtances of the power of motion.

We are not warranted in conſidering the tongue as an organ of taſte in all animals, becauſe it is ſubſervient to that function in the human ſubject, and in ſome other inſtances. We have already obſerved, that this organ, in many caſes, ſerves merely for taking in the food; and it is at leaſt very doubtful whether it poſſeſſes the ſenſe of taſte in many others. Yet, on the contrary, we ſhould not be warranted in denying the exiſtence of the ſenſe in theſe animals, nor even in ſuch as are entirely deſtitute of a tongue; for this function may be exerciſed by other parts. The organ which is commonly conſidered as the tongue of inſects, merely ſerves for taking in the food. But the accurate obſervations of profeſſor Knoch, (in his Contributions to the Knowledge of Inſects, in German,) renders it very probable, that the poſterior pair of palpi, or feelers, poſſeſſes the power of taſte in ſeveral of this claſs.

Numerous facts have long ago proved, that ſeveral inſects can diſtinguiſh the odorous properties of bodies, even at conſiderable diſtances. But the organ in which this ſenſe reſides, has not hitherto been clearly pointed out. Since all red-blooded terreſtrial animals ſmell only through the medium of the air which they take in in inſpiration, ſeveral naturaliſts have ſuppoſed, that the ſtigmata of inſects are to be conſidered as organs of ſmelling. Others aſcribe this office, and with ſome probability, to the anterior pair of palpi.

There is no doubt that ſeveral inſects poſſeſs the ſenſe of hearing, but the organ of this ſenſe is very doubtful. In ſome of the larger animals of the genus cancer, a part can be diſtinguiſhed which ſeems to be analogous to the veſtibulum of the former claſſes. A ſmall bony tube is found on each ſide at the root of the palpi; its external opening is cloſed by a finer membrane; and it contains a membranous lining, on which a nerve, ariſing from a common branch with that of the antennæ, is expanded. The latter circumſtance might favour an opinion, that the antennæ themſelves are organs of hearing: but this is refuted by conſidering the exquiſite ſenſe of hearing, which ſome inſects poſſeſs, who have no true antennæ, as the ſpiders; and by experiments on others, which ſhew that the ſenſe of hearing is not weakened by removing the antennæ.

The compound eyes and the ſtemmata have been deſcribed in the article Entomology. The former are found in different numbers in moſt of the aptera, as alſo in the larvæ of many winged inſects. When theſe undergo the laſt or complete metamorphoſis, and receive their wings, they gain at the ſame time the large compound eyes. Several genera of winged inſects, and aptera (as the larger ſpecies of monoculi) have ſtemmata beſides their compound eyes. Farther inveſtigation is neceſſary to ſhew how theſe eyes enable the inſect to ſee; and to determine the diſtinctions between two ſuch very different organs. Blumenbach conſiders that the ſtemmata are deſigned for ſeeing near objects, and the polyedrous eyes for diſtant ones; becauſe butterflies have the latter only in their winged or perfect ſtate, while in the caterpillar ſtate they have only ſtemmata. He acknowledges, however, that this opinion is very doubtful, becauſe ſome inſects, which live completely underground, as the mole-cricket (gryllus gryllotalpa, Linn.) have both kinds of organs.

On the organs of the ſenſes in this claſs, the reader may conſult Lehmann, de ſenſibus externis animalium exſanguium: commentatio premio regis ornata, Goëtting. 1798, 4to. F. J. Schelver verſuch einer naturgeſchichte der ſinnes werkzeuge bey den Inſecten und Würmern; Eſſay towards the Natural Hiſtory of the Organs of Senſe in Inſects and Vermes; Goëtting. 1798, 8vo. Lehmann de antennis inſectorum, 1799, 8vo. Knoch's neue beyträge zu der Inſectenkunde; Contributions to the Knowledge of Inſects.

Organs of the digeſtive Functions.—For a general account of the parts about the mouth and their nomenclature, ſee Entomology.

Jaws of the Cruſtacea.—Moſt of the genus cancer have at their mouth five or ſix pairs of organs, which muſt be regarded as jaws, ſince they move laterally in a horizontal plane; they are placed ſucceſſively one over the other, and the moſt exterior has been called by ſome anatomiſts the lip, but wrongly; ſince it is not ſingle, and the two parts which compoſe it have lateral motion like the others. All theſe jaws are articulated under the thorax, anteriorly with reſpect to the feet, of which they ſeem to continue the ſeries in front; and each of them has, on the inner ſide of its root, a membranous plate, which, ſlipping under the lateral border of the thorax, between the anterior branchiæ, ſerves to ſeparate their lobes, and to compreſs them in the act of reſpiration, The feet have ſimilar laminæ for the poſterior branchiæ, but they are deficient in thoſe ſpecies which have the branchiæ under the tail, as the ſquilla. (Fab.)

Theſe jaws, with the exception perhaps of the one or two moſt interior parts, are formed of two diviſions; of one, which may properly be called the jaw, and another, which is its dorſal palpus or feeler. The latter is more elongated, and terminates in an articulated and pointed thread: the other has at its end, but in the two firſt pairs only, a feeler which does not end in a pointed briſtle like the other. This arrangement is common to the crab, lobſter, cray-fiſh, hermiteral, and, in general, to all the cruſtacea decapoda of Latreille. In the firſt the outer jaw is flattened, and joined ſo well to the correſponding piece and to its feeler, that the four pieces together form a kind of ſhield, which covers all the other jaws. But in the lobſter and cray-fiſh the outer jaw is priſmatic and ſtrong; and the diviſions of the feeler being nearly as large as the body of the jaw, the whole together reſembles a foot, and has often been deſcribed as ſuch by the ancient naturaliſts.

In the cruſtacea decapoda, the ſecond jaw, reckoning from the outer one, reſembles the firſt, whatever may be its form, except that it is ſmaller, and that its inner edge is extenuated and ciliated, inſtead of being denticulated. The body of the third is divided into two lobes, the fourth into four, and the fifth into two; all theſe three are thin and ciliated. The palpi of the two latter have generally a ſimple point inſtead of a thread. The ſixth is merely a ſmall, oval, membranous plate, without cilia or palpus. Some varieties are obſerved in the number and figure of the jaws in the cruſtacea. Thus, among the decapoda, the ſcyllarus (Fab.) has no thread-like proceſs on the dorſal piece of the two firſt jaws; the third is undivided, and the fourth only divided into two without a dorſal piece in either. The fifth and laſt is the uſual ſmall oval plate. Among the branchiopoda there are ſtill more remarkable differences: in the ſquilla (Fab.) the two firſt jaws are extremely ſlender and elongated, have the form of feet, and are terminated by a dilated rounded articulation, and a moveable hook. They really perform the office of feet, and not of jaws, and have no dorſal palpi. The third is a long plate, with three notches on its inner edge. The fourth is bifid; its inner lobe is ciliated; the external is pointed, and has on its dorſal ſurface a ſmall oval palpus of a ſingle articulation. The fifth and laſt is a ſimple plate.

Notwithſtanding all theſe varieties, it is ſtill true that all the cruſtacea have many pairs of jaws, very different from each other in their functions; and that theſe organs muſt act on the food, and prepare it for the proper maſtication in a peculiar manner. In fact, over all theſe organs are found the true mandibles, which are very ſtrong in all the genera. The triturating part varies in form. In the lobſter and cray-fiſh there is on the inſide a blunt and truly molar ſurface, and on the outſide a cutting edge divided into three rounded denticulations. In the hermit crab the denticulations are pointed and ſeparate. In the crab there is a continuous cutting edge. The ſcyllarus (Fab.) has two ſeparate denticulations; a pointed one in front, and a blunt one behind.

The ſtructure of the mandible is the moſt ſingular in the ſquilla. It is divided into two parts; an anterior one concealed under the lip, directed according to the axis of the body, pointed, and having two rows of ſmall denticulations; a poſterior tranſverſe one, with the cutting edge directed from below upwards, and poſſeſſing a row of ſtronger denticulations. All theſe mandibles have feelers: they are compoſed of three articulations, and dilated at the end in the lobſters, crabs, &c.; of three articulations, and pointed in the ſquilla; of a ſingle piece in the ſcyllarus, &c.

The entomoſtracea vary ſtill more than the ordinary cruſtacea. The molucca crab (monoculus polyphemus, Linn.), has five pairs of maxillæ, ſhort, compreſſed, and covered with ſmall ſpines; each poſſeſſing a very large palpus like a foot, with four articulations, terminated by a pincer like that of the fore-feet of the crab and lobſter. The pincers of the firſt pair are very large in the male. Thoſe of the laſt are ſmall, and accompanied by ſome ſcaly laminæ. In front of theſe maxillæ is the upper lip, of a priſmatic figure, having two palpi compoſed of two pieces, and terminated by pincers. The lower lip is behind the laſt pair of maxillæ, and is formed of two denticulated plates. The monoculus apus has two ſtrong and toothed mandibles, then two pairs of ſmall maxillæ without palpi, and laſtly twenty-ſix other pairs of broad plates reſembling maxillæ by their baſes, and branchiæ in the reſt of their extent, and of which the firſt has four palpi reſembling articulated briſtles: three of theſe are very long, and have been taken by ſome for antennæ. Theſe twenty-ſix pairs of plates occupy nearly the whole under ſurface of the body.

The ſmaller entomoſtracea have been very little examined in reſpect to the organs of the mouth. The family of the oniſci reſembles the cruſtacea in the multiplicity of their jaws, as by their four antennæ; perhaps it ought even to be entirely aſſociated to them. The firſt pair, which has alſo been called the lower lip, although it is clearly divided into two halves, is plane, and covers all the others: it has a very ſmall feeler on its external angle. Next to this come two or three thin oblong pairs, of which the ſecond is denticulated at its end: theſe have no palpi. The mandible is ſtrong, denticulated, and has a ſmall conical feeler. Theſe organs are exceedingly diminiſhed in the paraſitic ſpecies, as in the cymothoæ (Fab.), which have only two pairs of maxillæ, like ſmall ſcales, ſmall, conical, obtuſe mandibles without teeth, and in the middle of the whole a ſmall conical tongue. The pycnogonum ceti (Fab.) has no viſible jaws, although we can ſtill diſcern two articulated palpi. The proper place of theſe, as well as of the other pycnogona, cannot at preſent be aſſigned. But ſome paraſitic inſects, which have been arranged among the entomoſtracea, do not belong to that claſs, and have a ſucker, like fleas. Such are the numerous calygi (Cuvier) found on the gills of fiſhes, &c.

Muſcles of the Jaws.—The mandible is moved on the cheſt by two muſcles. One ſtrong and long approximates its looſe edge to that of the oppoſite ſide, and at the ſame time elevates it. It is fixed by two diſtinct fleſhy portions to the membrane which covers the thorax interiorly above and on the ſides of the ſtomach. One of theſe pieces is anterior and ſmaller: it is compoſed of ſhort radiated fibres, terminating in a ſlender bony tendon, articulated to the tendon of the firſt portion, of which it appears to be an angular production. The largeſt portion is leſs oblique; it is ſituated between the liver and ſtomach: its fibres, more numerous and alſo radiated, terminate at the extremity and front edge of the common bony tendon, which is itſelf fixed to the middle of the looſe edge of the mandible, which it tends to elevate by drawing it towards that of the oppoſite ſide.

The other muſcle is inſerted in a particular eminence near the middle of the oppoſite or fixed edge. Its fibres are ſhort and numerous. They paſs downwards and backwards, and are fixed towards the middle line of the bony caſe of the cheſt. Their contraction will produce a contrary effect to that of the preceding muſcle; that is to ſay, it will draw the edge of the mandible away from that of the oppoſite ſide.

There appear to be two other muſcles in the crab, having the ſame functions; but they are ſituated at the articulated extremity of the mandible. Each articulation of the feeler contains two muſcles, a flexor and an extenſor; of which the former is the largeſt. The flexor is placed in the broadeſt part of the concavity of the mandible: it is inſerted in a ſmall bony tendon ſituated at the anterior edge of the articulation. The extenſor is more ſlender, and attached to the fixed edge of the mandible; it is attached by a long and ſlender tendon to the poſterior edge of the articulation of the firſt piece. The muſcles of the two other pieces of the feeler are arranged nearly in the ſame manner.

The maxillæ are moved from within outwards, and reciprocally, by muſcles analogous to thoſe which we have juſt deſcribed as belonging to the mandibles; and the pieces which compoſe them, when they conſiſt of ſeveral articulations, contain in their interior two muſcles, an extenſor and a flexor, very ſimilar to thoſe of the legs.

Moreover, each of the maxillæ, and particularly of the lower ones, has, on the piece correſponding to the hip in the legs, one, two, and ſometimes three laminæ directed interiorly to the cavity of the branchiæ; theſe will be conſidered in the account of reſpiration.

Jaws of Inſects.—1ſt. *In the Gnathaptera* (Cuvier.)—This order obſerves no common law, like all thoſe which are founded on negative characters only; it muſt be divided into families, in order to obtain ſome general rules. The firſt, that of the millepedes, affords none; for the iuli have only ſmall mandibles, under which is a conical piece compoſed apparently of the lower lip and the maxillæ conſolidated together, without any feeler. The ſcolopendræ have ſmall mandibles, larger maxillæ without palpi, a pair of palpi under them, and a large lower lip, of which the articulated and pointed palpi form together a ſtrong pincer. The ſecond family, or the arachnidæ, has ſtrong mandibles which cannot cut, but are armed at their extremity with a moveable hook, often forming a pincer, with a prominence of the body perforated for ſucking. The maxillæ are ſcarcely viſible, and only ſerve to ſupport palpi, which are always very long, and in the form of feet, and ſometimes enormous, as in the ſcorpions, where they reſemble the claws of crabs. In the phrynes, where they furniſh the animal with a formidable weapon, there is neither lower lip nor labial palpi. We might conteſt the propriety of calling theſe organs mandibles, ſince they ſerve for ſucking and not for maſticating; but their poſition, and the analogy of other inſects, forbid us to refuſe them this name. Fabricius has founded the character of his claſs of unogata on the ſmall moveable hook which terminates them.

The third family, that of the ricini, or fleas of birds, has only mandibles, between which is a ſmall roſtrum, and appears to have neither maxillæ nor lips. Thoſe of the lepiſma and podura have not been ſufficiently examined.

2dly. *In the Neuroptera.*—This order is not much more conſtant than the preceding in the forms of the mouths of the inſects belonging to it. We meet firſt with the beautiful family of the agnatha, inſects deſtined to live ſcarcely a few inſtants in the perfect ſtate, and poſſeſſing merely what is neceſſary for copulation and laying. They have no occaſion

ſion for eating, and poſſeſs only an imperfect mouth, without any mandible, and with membranous maxillæ attached to the whole length of the lower lip.

The family of the odonata, or libellulæ, which are the moſt ſtrongly armed, and the moſt cruel of inſects, is of a nature quite oppoſite to theſe. Their mandibles have an anterior, hooked, and, as it were, cutting portion, and a poſterior truly molar ſurface, with four pointed tubercles. It is curious to obſerve in theſe inſectivorous inſects the ſame characters as in the quadrupeds which are nouriſhed by ſimilar food. The maxillæ are divided into long pointed denticulations like needles, and have palpi without articulations. An enormous lower lip covers all this apparatus; it is divided into three or four lobes, of which the lateral ones are themſelves ſometimes terminated in the form of pincers.

The other neuroptera are leſs diſtinctly characterized. They have, in general, ſtronger or weaker mandibles; maxillæ with articulated palpi, which are two in number for each maxilla in the myrmeleon and the aſcalaphus, and ſolitary in the others; a lower lip, terminated by a tongue, which is ſimple in moſt kinds, divided into four in the termes and pſocus, having two very large and club-ſhaped articulated palpi in the myrmeleon; and no particular characters in the other genera.

The moſt curious mouth, in this order of inſects, is that of the panorpa. Its mandibles are ſmall, and placed at the end of a long ſnout; of which the under part is filled by a lip, and very elongated maxillæ conſolidated together. Here the ſubdiviſion of the lip commences, into the horny piece (ganache of Latreille) at the baſis, which ſupports the labial palpi, and the tongue, or membranous organ, placed at the extremity between the labial palpi.

3dly. *In the Hymenoptera.*—This natural family, the moſt intereſting of the inſect tribe, by the numerous and varied inſtincts with which the different ſpecies are endowed, has, in the ſtructure of its mouth, a character of which the firſt appearance has juſt been indicated in the panorpa. Part of the baſis of the maxillæ, and the horny portion of the lower lip (the ganache), are there united by a membrane, and are always moved together. The portion of the jaw beyond the feeler covers the tongue more or leſs, and ſerves it for a ſheath, which is ſometimes very complete.

The hymenoptera, which ſuck the nectar of flowers, may be recognized by the prolongation of their maxillæ and lower lip, which are often much longer than the head, but admit of being folded up ſo as to be withdrawn under the production of the mandibles. This kind of organ is ſometimes placed on a pedicle, which admits of being moved backwards and forwards. This may be ſeen in the bee and the neighbouring genera. In theſe elongated trunks the tongue forms the eſſential part, the true ſucking tube: but it is always only rolled ſo as to form a half tube, and opens longitudinally below.

In the bee, one of the articulations of the labial palpi is prolonged, and forms the firſt ſheath of the tongue; the outer portion of the jaw is prolonged in a ſimilar way to form a ſecond ſheath; Fabricius calls this ſtructure lingua quinqueſida. In the Eucera (Fabr.) two ſcales of the baſis of the tongue, which are clearly ſeen in the bee, where they are very ſmall, are prolonged as much as the tongue, and the organ is therefore a lingua ſeptemſida. In other genera the labial palpi do not ſerve for ſheaths, and the trunk is therefore trifid, as in the ſphex arenaria, &c. Even where the tongue is not prolonged into a trunk, it is always opened below; and this is a character peculiar to the hymenoptera, whence it reſults that their mandibles aſſiſt them but little in procuring their food, but ſerve them merely as armour, and as inſtruments for working. What they might chew would arrive with difficulty at the under ſurface of the tongue to be ſwallowed; but the latter organ imbibes nutritious matter in the liquid form, or in a ſtate of minute diviſion, as the pollen of plants, &c. Theſe genera with ſhort tongues preſent very intereſting differences in the form of the organ. It is ſometimes ſimple and conical, as in the evania, or formed like an oval ſpoon, as in the ſirex, the mutilla, and the hornet, or dilated and grooved, as in the leucopſis, or divided into three pieces, as in the tenthredo, or into three conical and villous briſtles, as in the ſcolia, or more or leſs equally and deeply divided into three or four lobes, as in the veſpæ, and moſt of the genera ſeparated from that of ſphex, &c. Theſe different configurations determine the kind of food which the animal employs, and the ſituations in which it procures it. The differences of the maxilla are leſs important: it forms in front merely a ſcaly piece, covering the tongue above, and having its length proportioned to that of the tongue.

The palpi vary more in their abſolute and relative length, in the form and number of their articulations. The bee has exceedingly ſmall maxillary palpi. The ſame may be ſaid of the ſirex, but the labial palpi are here large and club-ſhaped. Moſt others have them filiform or ſetaceous, and with ſeveral joints. The upper lips ſometimes aſſumes a peculiar form for a particular office. In the leaf-cutting bees, for example, it forms a ſcaly ſhield, protecting the trunk, upon which it is folded back, that it may not be injured by the edge of the leaf which the mandibles cut.

4thly. *In the Coleoptera.*—Theſe, although they are exceſſively numerous, form a natural order. Their lower lip is not placed between the maxillæ, as in the preceding order, but really below, ſo as to conceal a part of them, when the mouth is obſerved from below; conſequently they are articulated between the lip and the mandibles, and not ſuſpended with the lip in a common membrane, as is the caſe in the hymenoptera. The opening of the pharynx is alſo formed upon the tongue, and not below it, as in the hymenoptera, ſo that the produce of maſtication takes that direction naturally. Such are the true characters of the mouth in this order; but that of having the maxilla free from adheſion to the lip is not excluſive, as Fabricius ſeems to have ſuppoſed, when he founded on this idea the name of eleutherata, which he has given to theſe inſects.

There ſeems to be only one family in this order, of which the character is determined in a ſtriking manner by the organization of its mouth; it is that of the carnivora. All of theſe have prominent mandibles and maxillæ, which are alſo hooked and cutting, four maxillary and two labial palpi; conſequently they are terrible enemies to other inſects. The chief circumſtance, by which they are diſtinguiſhed from each other, is the figure of the horny and membranous part of the tongue, which are more or leſs lobated: they may alſo differ in ſome unimportant acceſſory, as the ſpines of the maxillæ, &c.

Another family, as natural as the preceding in all the circumſtances of its external and internal organization, that of the lamellicornia, poſſeſſes ſcarcely any common characters in the parts of the mouth. Some have enormous projecting mandibles, more or leſs reſembling the horns of the ſtag (lucanus); others have only ſhort but ſtrong mandibles (the dung-beetles, geotrupes of Latreille); in others they are membranous and ſcarcely viſible (the cetoniæ, Fabr. the ſcarabæi, the copris.)

Some have ſtrong maxillæ well furniſhed with teeth (the
melolonthæ,

melolonthæ, Fabr.) ; others have them ſimply ciliated (the cetoniæ), or in the form of a pencil (the lucani.)

The ſame variations take place in the lips and palpi, and are not merely obſerved between the different genera. For, although great pains have been taken to ſubdivide this family into numerous genera, none of theſe arrangements are founded on a perfectly ſimilar conformation of the mouth. Nothing can prove more clearly the impracticability of the project, ſo reſolutely perſiſted in for thirty years by M. Fabricius, of eſtabliſhing a method of inſectology on the conformation of the mouth only.

A third natural family of the coleoptera, that of the roſtricornia, is characterized by having its mouth at the end of a long ſnout. Such of the others as are well determined, for example, the herbivora, the lignivora, &c. have no ſtriking character common to all the genera, although there is a certain reſemblance.

The different configurations of the palpi, of the horny and membranous portions of the tongue, of the maxillæ, &c. have been carefully deſcribed by naturaliſts : but their labours have not hitherto furniſhed any general remarks which ſuit our preſent purpoſe.

5thly. *In the Orthoptera.*—This order is very uniform in the ſtructure of the mouth ; it poſſeſſes always ſtrong mandibles and maxillæ, under which is the lower lip. A moveable upper lip covers the mandibles more or leſs completely. The maxillæ are ſtrongly denticulated, and have always an articulated feeler, and another not articulated, which ſometimes grows ſo broad as to cover and protect the maxillæ, whence it has been called galea : but often it is as ſlender as a thread. The lower lip has always two articulated palpi, between which is a more or leſs divided tongue. The pharynx opens upon the tongue, as in the coleoptera, not under, as in the hymenoptera ; ſo that theſe inſects are true maſticators : the principal differences of the genera are founded on the diviſion of the part called the tongue, and on the equality or inequality of the portions. Thus, in the mantis there are four, pointed and equal: in the phaſma the two middle ones are much the ſhorteſt. The achetæ, locuſtæ, and acridia of Fabricius, have the two outer ones broad and rounded ; and the intermediate one ſhort and pointed. The blattæ and the forficulæ have two oblong ones ; the truxalides (Fabr.) the grylli, and the pneumoræ, have only two rounded ones, &c.

6thly. *In the Larvæ of Inſects.*—Theſe organs are not diſtributed in the larvæ, as in the perfect inſects : many larvæ with jaws produce perfect inſects, which have none, ſuch are all thoſe of the papilios, and ſeveral of the diptera. Different larvæ have often ſimilar jaws when the inſects produced from them have very different ones ; as in the whole family of the lamellicornia.

The larvæ of inſects which go through an incomplete metamorphoſis, have the ſame kind of mouth as the perfect inſects, with the exception of ſome modifications in the proportions of parts ; thus the mouth of all the orthoptera is the ſame in the three ſtates. The change of proportions juſt mentioned produces the moſt ſenſible effects in the neuroptera odonata or the libellulæ. Their mandibles and maxillæ are the ſame in the larva as in the perfect ſtate. Their lower lip preſents alſo the ſame diviſions, but it is placed on a very long pedicle, with an angular turn or elbow in its middle, ſo that it remains commonly in its natural poſition under the maxillæ, but the animal can, by ſtraightening the curved pedicle, carry it ſuddenly conſiderably forwards : and, as the notches which terminate it will ſerve the purpoſe of pincers, they are employed for ſeizing the ſmall inſects which come within reach. When the libellula has its wings, it no longer needs ſuch an artifice : its lip is ſhortened, and confined to the ordinary functions.

The larvæ of the hymenoptera have very ſimple organs of maſtication, conſiſting principally of ſmall, ſhort, and ſtrong mandibles. The mouth of the larvæ of the coleoptera has the ſame parts as that of the inſects ; but they are differently ſhaped. Thus the lucani, which in the perfect ſtate have ſuch enormous mandibles, and ſuch peculiar pencil-ſhaped maxillæ, have, while larvæ, a nearly orbicular upper lip, immediately articulated with the front ; ſhort, ſtrong, thick, pointed mandibles, ſlightly arched externally and on the inner ſide ; towards their looſe extremities they have three denticulations on one plane, and towards their baſes a ſtriated and plane molar ſurface : it is plain that theſe are in their mouth inſtruments for cutting and chewing wood. The maxillæ are terminated by two ſmall hooks, of which one is moveable, a very ſingular ſtructure, and ſupport a feeler of four articulations. The lower lip is broad, and in a manner truncated, and has two palpi ; each compoſed of two pieces.

The ſcarabæi differ remarkably from the lucani in their mouth ; but the two genera agree almoſt entirely in the mouths of the larvæ ; the ſame obſervation may be made of the melolonthæ and cetoniæ, which are alſo very different from each other.

This ſmall moveable hook may be conſidered as a ſecond maxillary feeler ; theſe larvæ would then have ſix, while their perfect inſects have only four. We muſt obſerve alſo, that the larvæ, both of the lucani and of the ſcarabæi, have two ſtrong teeth on the upper ſurface of the lower lip near the pharynx.

The prioni (Fabr.) which have elongated mandibles like the lucani, have nothing of this kind in the larva ſtate. There is a very large upper lip, lobated, rounded, villous, ſupported by a membranous lamina, then two ſtrong, curved, cutting mandibles, furniſhed at their baſes with two conical palpi, of which the rings enter one into the other, like the tubes of a teleſcope, and which are probably the rudiments of antennæ. A ſoft maſs, conſiſting of three lobes placed behind the mandibles, repreſents, by its middle lobe, the lower lip with two very ſhort rudiments of labial palpi, and, by each of the lateral lobes, the maxillæ properly ſo called with its proper palpi, compoſed of four conical articulations, of which the laſt is the ſmalleſt.

On the contrary, the dytiſci, which have very ſlightly prominent mandibles, have them very long in the larva ſtate. They repreſent two ſharp hooks, perforated at the extremities, which ſerve for ſucking. There are no viſible maxillæ, but merely two long filiform palpi of five pieces ; while the perfect inſect has four maxillary palpi. This is exactly the reverſe of what we have juſt ſeen in the lamellicornia. Inſtead of the lower lip there are two tubercles, each of which ſupports a feeler of two pieces. The larva of the hydrophilus alſo wants the maxilla, but has four palpi ; the mandibles are ſhort, cutting, and not perforated.

Of all larvæ, thoſe of the lepidoptera differ the moſt widely from the perfect inſects in reſpect to the mouth ; and, what is very ſingular, their mouth is conſtructed on the plan of that in inſects with jaws, although it poſſeſſes no trace of theſe parts in the butterflies. Under a ſemi-orbicular upper lip, and under two ſtrong, cutting, denticulated maxillæ, are three tubercles repreſenting the lower lip and the maxillæ ; the latter ſeem compoſed of pieces, which enter more or leſs one into the other, and terminate by two ſmall tubercles, of which the internal, armed with two ſtiff briſtles or teeth, is the maxilla properly ſo called; the other is the feeler. The lower lip has two very ſmall palpi, and a hollow point in the middle: this is the ſpinning hole, through which the ſilk comes out, employed by the caterpillar for forming its coccoon.

The Muſcles.—When the upper lip is moveable, it is drawn backwards by two bundles of fleſhy fibres ſituated within the cranium, and which are themſelves divided into two planes. The motions of the mandibles are analogous to thoſe of the hips in inſects. At the baſis, on the ſide correſponding to their convexity, there is a kind of condyle, or convex rounded eminence, received into a ſmall cotyloid cavity, excavated in the temporal ſcale in front of, or below the eye. On the ſide correſponding to the cutting edge of the mandible, there is commonly obſerved, at leaſt in large inſects, ſuch as the ſcarabæus monoceros, the prionus, the capricorne (cerambyx), the lucanus cervus, the locuſta, a kind of ſolid tendinous plate, which is apparently prolonged into the interior of the ſolid parietes, and affords attachment to muſcular fibres implanted in it laterally, as the barbs of a feather are on the common ſhaft. Theſe muſcles approximate the jaws to each other, or ſhut the mouth. Thoſe which ſeparate the mandibles and open the mouth are much ſhorter, and not one-tenth of the ſize of the preceding. They are inſerted in a ſmall apophyſis, correſponding to the convex external line of the mandible, on the outſide of the condyle. Lyonet has deſcribed and figured theſe muſcles in the larva of the phalæna coſſus. He calls them adductors and abductors; but he has regarded as ſo many diſtinct organs, the faſciculi of fibres inſerted into the common tendon; ſo that he has diſtinguiſhed nearly eleven muſcles or bundles deſtined to cloſe the mouth, and three principal planes for the purpoſe of opening it. Theſe fibrous planes are found in all other inſects; but very great varieties are obſerved in their number and relative diſpoſition. Theſe differences depend evidently in the firſt place on the very different inſertions of the tendinous plates, which are to be conſidered as prolongations of the muſcles: they ſeem alſo to be modified by the length and ſize of theſe plates. The latter always have a relation to the form and extent which the internal parietes of the mandible and of the cranium afford for their inſertion.

Salivary Organs.—No expreſs organ, for the purpoſe of ſupplying a ſalivary ſecretion, has been hitherto diſcovered in the cruſtacea; but the place of ſalivary fluids is ſupplied in the following manner. The branchiæ, placed at the ſides of the body, under the edges of the corſelet, are compreſſed and agitated by the cartilaginous plates connected to the jaws and feet; at this time, the water in contact with the branchiæ flows along theſe plates, and comes out at the two ſides of the mouth; hence, when a crab or lobſter is taken out of the water, much froth is obſerved to iſſue from that part. This water, although foreign to the body, may ſerve to moiſten the food, when the animal eats out of water. At other times no ſaliva can be needed, as in the cetacea and fiſhes.

Many inſects furniſh, during maſtication, more or leſs fluid, which is often acrid, and of a penetrating odour, and ſupplies the place of ſaliva. In the carabi it is black and fœtid, very corroſive in ſome grylli; and capable, in the larva of the coſſus, of ſoftening and diſſolving the wood of the willow, on which the animal feeds.

The ſources of theſe fluids are not yet known in all ſpecies; probably, however, they are produced by organs analogous to each other, and thoſe of one ſpecies may ſerve as an example of the reſt. The larva of the coſſus has two long ſpongy veſſels, like all the ſecretory organs of inſects, very much convoluted, and opening into a large reſervoir, which communicates with the mouth by a ſmall canal. This organ ſeems to produce a liquor, neceſſary to the animal for the purpoſe of acting on the wood by which it is nouriſhed. It is deficient, or very ſmall in moſt other caterpillars.

Organs of Deglutition.—1ſt. In inſects with jaws. The membranous extremity of the lower lip, in the coleoptera, and the orthoptera, which has been called a tongue, ſcarcely deſerves that name. But in the ſecond of theſe families there is a real fleſhy tongue, looſe only at its point, and analogous in figure to that of quadrupeds. The odonata, among the neuroptera, have a ſtructure ſomewhat ſimilar; but the tongue of the hymenoptera is only a membranous tube, often open below, and forming the extremity of the lower lip. In the waſps, and in all the hymenoptera, which have no trunk, it has an arched form, being open and concave below, and more or leſs divided into pieces. The bees, and all the hymenoptera which have a long trunk, poſſeſs a complete tube with annular fibres: ſuction is performed by the ſucceſſive contraction of theſe fibres.

2dly. In inſects without jaws. Since deglutition is the firſt act of nutrition in theſe inſects, the form of the organ employed in ſuction determines the ſpecies of juice which the animal can imbibe, and conſequently influences very conſiderably its way of life. The relations of the natural families of theſe animals to their organs of ſuction, are much more conſtant than they are to the inſtruments of maſtication in the other half of the claſs. There are four orders of inſects without jaws, *viz.* hemiptera, lepidoptera, diptera, aptera; and there are three kinds of ſuction particularly belonging to the three firſt of theſe. The hemiptera have a ſtiff proboſcis enveloped in a ſheath; the lepidoptera a membranous trunk ſpirally convoluted; the diptera a trunk terminated by two fleſhy lips. Hence the names of rhyngota, gloſſata, and antliata applied by Fabricius to theſe three orders; which he has preſerved the ſame as in the Linnæan arrangement, and which many others had adopted before.

The greateſt varieties are obſerved in the diptera. In this order the organ conſiſts eſſentially of a fleſhy trunk, divided below into two lips more or leſs prolonged, and capable of being applied to the object which is to be ſucked: two tentacula are detached to the root of this trunk. Between the latter is a pointed ſcale, ſometimes employed to cut the veſſels from which the fluid is to be ſucked, but often ſerving only to cover other pieces, which are much ſharper and more appropriate to this function. In the ſtratyomys, and the common flies, there is merely a ſingle ſhort point under the ſcale. The ſyrphi and rhingiæ have in addition a ſtiff briſtle under each palpus. In the rhagio there are three briſtles under the ſcale, and the middle of them is the ſtrongeſt. The tabani have four, all pointed and ſharp like the blades of lancets; hence theſe inſects have the power of inflicting the ſevereſt wounds on the ſkin. All the parts are much elongated in the genera empis and bombylius; the trunk is more particularly extended than the briſtles in the latter, which indeed have only one briſtle under the ſcale. In the empis all the parts are equally prolonged, and there are four briſtles.

In the myopa (conops, Linn.) the trunk is elongated into a ſlender tube with an angle at its middle; there is a ſhort ſcale without any briſtle. In the aſilus and ſtomoxys (conops, Linn.) the trunk is hardened, and aſſumes a horny texture, ſo that it is capable of cutting. There is a ſingle briſtle within it in the ſtomoxys, and three in the aſilus. The trunk is reduced almoſt to nothing in the hippoboſca; and the ſingle briſtle is long and flexible.

All theſe genera have palpi of a ſingle piece. The tipulæ and culices have them articulated, and often very long; the trunk of the tipulæ is ſhort, with large lips, and no briſtle; that of the culices is long, ſlender, and contains a fine briſtle.

In the œſtri, all the external organs of the mouth are withdrawn within the head, ſo as to expoſe externally only three rather prominent points.

The hemiptera (rhyngota, Fabr.) are more uniform in the ſtructure of theſe parts than the diptera; in general they have a tube compoſed of ſome articulated pieces, and open above in its whole length. This tube contains three fine briſtles nearly as long as itſelf; it exhibits ſcarcely any other varieties except in its poſition and inflexions.

The lepidoptera (gloſſata, Fabr.) are equally uniform in the ſtructure of theſe parts: their tongue is formed of two membranous plates, curved tranſverſely in their whole length, ſo as to form a tube, and, when the inſect does not employ it, convoluted ſpirally, and lodged between two flat villous palpi, compoſed commonly of three pieces. The differences depend on the variable length of this organ, which is ſometimes very inconſiderable, and on the figure of the palpi: they are not of importance in connection with our preſent ſubject.

Among the aptera, the louſe has only a ſimple and ſhort ſucker, incloſed in a ſmall prominence: the flea has one with two briſtles, incloſed in a ſheath of three pieces, opened longitudinally above.

Inteſtinal Canal.—It is ſtraight in the cruſtacea, and uniform in its ſize, with the exception of the ſtomach. The latter is very different in the cruſtacea decapoda, and in the branchiopoda, it poſſeſſes, in the former, a ſingularity of ſtructure, which is remarkable as the only example of the kind in the whole animal kingdom; that is, it is ſupported by a bony apparatus, a ſpecies of ſkeleton, and conſequently does not collapſe when empty. The deſtination of this apparatus is not leſs extraordinary than its exiſtence; it ſerves to ſupport five hard and moveable teeth, which perform in the cavity of the ſtomach a true maſtication. They are placed before the pylorus, and allow no ſubſtances to paſs through that opening until they are perfectly triturated.

The ſtomach is found in the thorax above the mouth, and the œſophagus communicates with it by a large aperture. The anterior portion is more capacious than the poſterior, and the teeth are placed where the cavity begins to grow narrower. On the ſuperior ſurface, or that which is oppoſed to the mouth, there is a thin tranſverſe plate occupying the middle of the ſtomach. This ſupports the firſt tooth or bony oblong plate, conſolidated to the ſuperior ſurface of the ſtomach, directed towards the pylorus, and terminating behind in a tubercle.

On this poſterior extremity is articulated a ſecond plate, directed backwards, bifurcated like the letter Y; and on each of its lateral diviſions another is articulated, which turns forwards and outwards, and reaches the lateral extremity of the firſt tranſverſe plate. The two largeſt teeth are fixed on theſe two lateral pieces. They are oblong, have flat crowns, which are grooved tranſverſely, and the grooves and inequalities vary in the different ſpecies. In the cancer pagurus of Linnæus, the crown is finely ſtriated, has large denticuli at its lower edge, and a prominent part in front which is not ſtriated. In the lobſter there are nine tranſverſe ribs, of which the three front are much the largeſt.

From the point of union of the tranſverſe portion with the lateral of each ſide, another lateral piece is continued, proceeding lower than the firſt, and having at its extremity a lateral tooth ſmaller than the preceding, placed rather before and below its anterior extremity, and having three and ſometimes even five ſmall, ſharp, and bent points. The two ſmall teeth with curved points ſeize the nouriſhment which comes from the mouth; they convey it between the two teeth with flat crowns, which bruiſe it between each other and againſt the firſt ſingle plate.

When it has undergone this operation, the aliment paſſes through the narrow part of the ſtomach, where its courſe is ſtill interrupted, firſt by a fleſhy oval prominence correſponding to the interval of the two large lateral teeth, and afterwards by a ſharp criſta, which divides the pylorus into two half canals.

There are muſcular fibres in this ſtomach, which approximate the bony pieces, and the teeth which they ſupport; there are exterior muſcles which ſeparate the teeth from each other, and are attached to the neighbouring, and particularly the lower parts of the thorax. Theſe muſcles muſt be ſubject to the will, which is another remarkable ſingularity belonging to theſe ſtomachs.

Theſe teeth are diſcharged from the ſtomach when the old ſhell is ſhed; and are ſupplied by new ones.

After this large ſtomach, which is always dilated, comes a very ſlender inteſtine, which takes a ſtraight courſe to its termination at the end of the tail. Towards its middle a thick ring is obſerved, on the inſide of which there is a ſtrong valve, and the commencement of a very long cæcum.

Theſe circumſtances have been aſcertained in thoſe cancers which have long tails, as the cray-fiſh and the lobſter, alſo in the paraſitical ſpecies (the hermit crab), and in the crabs, as the cancer pagurus, puber, and mænas: the ſtructure may therefore be conſidered as common to all the cruſtacea decapoda. The branchiopoda poſſeſs a ſmall membranous ſtomach, ſhaped like a triangular priſm, furniſhed on each ſide of its poſterior extremity with a row of ſmall pointed teeth, and followed by a very thin inteſtinal canal, continued from one end of the body to the other, and nearly uniform in ſize throughout.

In the oniſci the front of the canal is a little ſwollen compared to the continuation.

In the reſt of the claſs of inſects we find as many varieties in the ſtructure of the alimentary canal, as in all the claſſes of vertebral animals together. There are not only differences between the families and ſpecies, but often very conſiderable ones between the larva and perfect ſtates of the ſame inſect: and all theſe varieties bear a very accurate relation, which in many caſes can be very clearly appreciated to the animal's kind of life, whether of ſhorter or longer duration. Thus the voracious larvæ of the ſcarabæi and butterflies have inteſtines ten times as large as the winged and ſober inſects, if we may be allowed to uſe that term, to which they give birth.

There are the ſame general reſemblances in the natural families of inſects, as in the reſt of the animal kingdom; thus all the coleoptera lamellicornia, all the carnivora have ſimilar inteſtines in each of their ſtates, &c. Here, as in the other claſſes, the length and complication of the inteſtinal canal indicate a vegetable nouriſhment; ſhortneſs and thinneſs, on the contrary, ſhew that the animal is carnivorous, &c.

I. *In the Coleoptera.*—We ſhall ſelect for deſcription ſome very natural families, which are remarkable for any peculiarities of ſtructure, and ſhall notice together the inteſtinal canal of the larva and of the perfect inſect, in order to exhibit in the cleareſt view the very ſtriking difference between theſe two ſtates.

1. In the coleoptera lamellicornia. The laſt mentioned

point is very clearly exemplified this family. The larvæ of all the genera, which compoſe it, have a large and ſhort alimentary canal, divided into the following parts. 1. A ſhort and weak œſophagus. 2. A ſtraight cylindrical ſtomach, tolerably thick and muſcular, ſurrounded by three circles of ſmall cæca, placed, one at the commencement, one at the middle, and the third at the end of the cylinder. Theſe cæca are numerous, weak, and ſhort: thoſe of the third circle are ramified in the larvæ of the ſcarabæi properly ſo called (les geotrupes of Latreille). In the melolonthæ the cæca of the firſt circle have ſmall lateral denticulations, which may be regarded as ſo many ſmaller cæca. The upper and lower circle in the lucani are compoſed of a ſmall number of large cæca, while the middle is made up of very numerous ſmall ones. Probably they all ſecrete and pour into the ſtomach ſome diſſolving fluid. 3. A ſhort inteſtine of much thinner ſides, and rather ſhorter in length than the ſtomach. Its origin, which is rather expanded, receives above the hepatic veſſels; it terminates at the poſterior extremity of the body of the larva. 4. An enormous colon, or large inteſtine, three times as large as the ſtomach, and filling all the poſterior third of the body. It poſſeſſes two ſmooth bands, between which are tranſverſe folds, producing a cellular appearance like that of the human colon. Its courſe is in a direction contrary to that of the ſmall inteſtine; that is, it returns from behind forwards, and lies upon that inteſtine. 5. A rectum turning from before backwards upon the colon, in order to terminate at the anus. It is ſlender and ſtraight, without any inequality.

We ſhould have expected that the perfect inſect would retain ſome trace of ſuch ſtrongly marked peculiarities; yet there is really no veſtige of them diſcernible. All theſe inſects, lucani, ſcarabæi, melolonthæ, cetoniæ, have a long ſlender canal, four or five times longer than the body, very much convoluted, and poſſeſſing hardly any dilatation. Sometimes the anterior portion is merely a little larger and folded tranſverſely.

2. In the coleoptera carnivora. As the habits of theſe animals are very different from thoſe of the preceding, their alimentary canal is different in both ſtates. In the perfect ſtate it conſiſts, of, 1ſt, a long and very dilatable œſophagus. 2. A firſt ſtomach, nearly ſpherical in its ſhape, with muſcular parietes and tranſverſe wrinkles. 3. A ſecond ſtomach, membranous, elongated, and villous; not on the inſide, as thoſe of certain vertebral animals are, but on the outſide. The villi are veſſels which draw, from the ſurrounding nutrient fluid, the gaſtric juice which they pour into the ſtomach, according to the laws of ſecretion in inſects; conſidered as animals which have no circulating organs. 4. An inteſtine of moderate length, between once and twice the length of the body, ſmall and uniform in its diameter throughout. 5. A conical and rather long cæcum inſerted near the anus. Near the margin of the anus are found two veſicles, which ſecrete the acrid fluid almoſt conſtantly voided by theſe animals when they are ſeized.

Such is the ſtructure of the genera ſeparated from the carabi, the cicindelæ, and the dytiſci: their larvæ have no dilatation like a ſtomach; their canal is ſmall, all of one ſize from the mouth to the anus, and about one-half longer than the body. A cæcum, however, may be obſerved near the anus in the larvæ of the dytiſci.

3. In the coleoptera clavicornia. The hydrophilus piceus, in its perfect ſtate, has very long cylindrical inteſtines (four or five times longer than the body), uniform in ſize throughout, and forming large convolutions in the abdomen. The larva, which is much more carnivorous, has ſhort inteſtines (half as long again as the body), of which nearly two-thirds form an elongated ſtomach, villous externally; the reſt is ſmooth, and divided by a contraction into two parts. The ſilphæ, on the contrary, have in their perfect ſtate ſuch a ſtomach, followed by a ſmall inteſtine twice as long as the body.

4. In the coleoptera lignivora. The larvæ of the prioni and cerambyces have very large inteſtines, with their ſides nearly uniform throughout, and forming four folds, each of which is as long as the body. The commencement, which alone can be compared to a ſtomach, is rather corrugated tranſverſely like a colon. The perfect inſect has firſt a membranous and round ſtomach, then an oval one, which is inſenſibly contracted into a cylindrical canal, ſuddenly growing ſmaller at the inſertion of the hepatic veſſels, and continuing ſo to the anus. The whole canal is at moſt twice as long as the body.

The larva of the lamia, Fab. has firſt a very diſtinct ſtomach, then a knotted ſmall inteſtine, which is ſuddenly changed into a large inteſtine longer than itſelf.

5. In the coleoptera filicornia, of the family of the veſicantiæ, the meloe poſſeſſes an enormous oval ſtomach, filling nearly the whole abdomen. The front is covered with ſtrong circular fibres; and a cylindrical valve, analogous to the valvula coli of man, is obſerved at the cordia.

In the family of the lucifuga, the tenebrio has a cylindrical elongated ſtomach, a firſt inteſtine, which is rather ſlender, and another ſomewhat larger. The whole canal is about three times the length of the body. The blaps has a muſcular cylindrical ſtomach, another equally large but membranous, ſeparated from the former by a ſlight conſtriction, and a ſmall inteſtine which is a little enlarged towards the anus. The proportionate length of the whole is about the ſame as in the laſt inſtance.

6. The brachelytra, or ſtaphylini, reſemble the carnivora in the villoſity of the ſtomach, as they do in their habits.

II. *In the Orthoptera.*—Theſe, in the claſs of inſects, ſeem analogous to the ruminants among the quadrupeds, at leaſt in reſpect to the complication of the ſtomach, and ſome ſuppoſe that their aliment may be ſeen brought back into the mouth for the purpoſe of a ſecond maſtication. As they undergo an imperfect metamorphoſis, their alimentary canal is the ſame in the larva as in the perfect ſtate. It conſiſts in general of the following parts. 1. An œſophagus of the uſual kind. 2. A firſt membranous ſtomach. In moſt genera this is a ſimple dilatation of the œſophagus, of which the internal membrane is ſmooth and folded longitudinally. In the locuſta it is rather, and in the blatta conſiderably larger than in the other genera. In the acheta it is an oval bag, having quite a lateral poſition, connected to the ſide of the œſophagus like a cæcum, with one opening for the reception and diſcharge of its contents. 3. A ſecond ſtomach or gizzard, ſmall, nearly round, poſſeſſing a very thick muſcular coat, and armed internally with ſcales or teeth. In the locuſta and acheta theſe are longitudinal rows of fine and numerous ſcales, placed one over the other like the tiles of a roof, and directed backwards. In the blattæ there is a ſingle row of ſix or eight large curved teeth, denticulated like the bills of birds of prey, and directed backwards. 4. The cæca or third ſtomachs are immediately round the poſterior orifice of the gizzard, and vary in number. The locuſta and acheta have two large ones, and this has given riſe to the remark that the grylli have four ſtomachs like the ruminating mammalia. The internal membrane is much folded, and its extremity receives many ſmall ſecretory veſſels, which pour out gaſtric juice. There are five of theſe cæca in the gryllus, and eight or ten in the blattæ. 5. The inteſtinal canal varying in length and diameter.

The earwig is ſaid to be very different from the other orthoptera in having only a ſimple elongated ſtomach, a very ſhort inteſtine, and a dilatation with longitudinal folds near the anus.

III. *In the Hymenoptera.*—The bees have a firſt ſtomach, which is membranous and tranſparent, pointed in front, large and divided into two portions behind. In this organ the nectar of the flowers is converted into honey: it is the reſervoir of this matter, which they depoſit in their hives by the act of vomiting. The ſecond ſtomach proceeds from the interval of the two diviſions; it is elongated and ſwollen laterally towards the middle. The hepatic veſſels are inſerted immediately after the pylorus. The firſt inteſtine is ſmall, and ſcarcely equal in length to the ſecond ſtomach: the rectum is large but ſtill ſhorter.

The firſt ſtomach of the waſp is ſmaller; the ſecond longer, and particularly much more muſcular. The larvæ of both genera have an immenſe cylindrical muſcular ſtomach, filling nearly the whole abdomen, and followed by a very ſhort inteſtine.

In the ſphex the ſtructure reſembles that of the bee; the parts are only larger in proportion to their length.

IV. *In the Neuroptera.*—The family of the odonatæ, which is truly carnivorous, has very ſhort inteſtines in its three ſtates: they do not exceed the length of the body. In the libellula grandis, Linn. a ſhort œſophagus is ſucceeded by a ſmall oval muſcular ſtomach, ſtriated longitudinally; then comes a ſtraight large inteſtine or ſecond ſtomach, with a conſtriction placed far back at the entrance of the hepatic veſſels. The interval between this part and the anus is very ſhort, and folded longitudinally. In its larva, the œſophagus has a circular dilatation: the conſtriction of the cordia produces a kind of valve. From this point the canal has a bright yellow colour, as far as the inſertion of the hepatic veſſels; its laſt portion is white and much thicker; and contains the ſingular reſpiratory apparatus, which we ſhall deſcribe afterwards.

In the family of the agnatha, the ephemera, during its larva ſtate, has merely a ſtraight uniform canal, without any convolution, which becomes extremely thin in the perfect inſect.

V. *In the Hemiptera.*—Theſe poſſeſs in general a ſimple, oval, and muſcular ſtomach, of conſiderable ſize, followed by a ſmall inteſtine of moderate length, near the end of which is a ſmall cæcum. Such at leaſt is the caſe in the nepa, notonecta, &c.

VI. *In the Lepidoptera.*—The caterpillars have a large, ſhort, ſtraight, inteſtinal canal, without any conſiderable inequalities. The œſophagus is the ſlendereſt portion, the ſtomach is elongated and contracted at the pylorus. After the pylorus the inteſtine is larger than in the reſt of its length; it is contracted towards the anus. At the latter part it has the ſtrongeſt circular fibres; on its parietes other fibres are found, variouſly decuſſated and ending in two white lines, which extend over its whole length, one above, and the other below. The diameter varies in different ſituations, according as the contents are accumulated. Sometimes the diſtinction between the ſtomach and inteſtine can ſcarcely be obſerved.

This canal is obviouſly calculated for ſolid and abundant food. The butterfly, which ſubſiſts entirely on the juices of vegetables, has a very different digeſtive apparatus. Among the diurnal inſects of this order, the atalanta has a ſlender œſophagus, with a membranous dilatation on its ſide, like a crop, more or leſs rounded in its figure, and often full of air. Then comes a ſecond elliptical membranous ſtomach, the ſides of which preſent many hemiſpherical cellular prominences; and afterwards a third, cylindrical, and rather muſcular, followed by a ſmall inteſtine of moderate length, terminated by a rather larger rectum.

VII. *In the Diptera.*—In general their inteſtinal canal is tolerably long in both ſtates. It is five times the length of the body in the larva of the ſtratyomys, and conſiſts of a ſhort œſophagus as ſlender as a thread, a very ſmall oval ſtomach, and an inteſtine, of which the firſt half is wrinkled tranſverſely, which becomes afterwards larger and ſmoother to the inſertion of the hepatic canals, below which it is ſuddenly conſtricted and remains narrow. The differences between this and the larva of the ſyrphus are very ſlight; and the diſtinctions between both and their perfect inſects are not more obvious. However, Swammerdam repreſents four ſmall cæca, after the ſtomach, in the larva of a fly which inhabits cheeſe; Cuvier has not found them in the diptera diſſected by himſelf.

VIII. *In the Gnathaptera.*—The ſcolopendræ have a long canal contracted behind; the iuli have an equally long and cylindrical one. We have already mentioned that of the oniſcus.

IX. *In the Aptera without Jaws.*—The louſe has two ſmall ſwellings at the origin of the ſtomach, which is elongated; the inteſtine is not longer than the ſtomach; it is ſmall, and terminated in front of the anus by a muſcular enlargement.

Hepatic Veſſels.—Although the cruſtacea have a heart and blood-veſſels, moſt of them have not a liver, properly ſo called. The organ which produces bile in them conſiſts of a conſiderable number of ſmall tubes ending in cul-de-ſacs. The ſtructure is analogous to that of the pancreas of fiſhes, which conſiſts, as we ſuppoſe, of the multitude of cæca opening at the origin of the inteſtine.

The appearance of the hepatic cæca in the cruſtacea diſcloſes their nature and office; they are yellow, have ſpongy ſides; produce a brown and bitter liquor, which gives its peculiar taſte to the ſoft ſubſtance in the body of the lobſter; for the hepatic cæca, with the ſtomach, fill nearly the whole thorax of theſe animals; and, in the hermit crab, they fill alſo a great part of the tail.

The ſquilla, Fab. is an exception to this rule; theſe animals have a liver of a firm texture, very much reſembling a conglomerate gland, conſiſting of lobes arranged on each ſide of the alimentary canal in its whole length.

In the inſects, properly ſo called, there is ſtill leſs appearance of liver than in the common cruſtacea. Since they can have no glands on account of the abſence of blood-veſſels, the bile, like all the other ſecretions, is produced in them by fine veſſels with ſpongy ſides, floating in the fluid, which bathes all the parts, and deriving from it, by the organization of their tiſſue, the elements proper for the formation of this liquor.

Theſe veſſels exiſt equally in the larva and in the perfect inſect: the fluid, which they form and contain, tinges them with its own colour. They are uſually yellow, ſometimes, as in the ſcarabæi and cerambyces, of an opaque white; and in other inſtances, as in the dytiſci, of a deep brown. Their bitter taſte ariſes from this fluid, which would probably be found to poſſeſs many of the qualities of bile, if it could be procured in ſufficient quantity for analyſis.

The number of theſe veſſels is variable; when it is large, they are ſhort, ſo that the extent of ſurface is nearly the ſame. Sometimes they all end in a common excretory tube, which terminates in the inteſtine. This is the caſe with the gryllo-talpa. They are commonly inſerted after the ſtomach, but ſometimes not till near the middle of the inteſtinal canal, as in the grylli; or even towards its end, as in the libellulæ. The oniſci alone have them inſerted near the œſophagus; in theſe inſects they are only four in number, large, undulated, as long as the body, and of an orange colour.

Among the neuroptera, the libellulæ have a conſiderable number of ſhort ones, ſurrounding the inteſtine at a ſmall diſtance from the anus, where it becomes large. The ſame ſtructure exiſts in the common grylli. In the gryllo-talpa there is a large packet of theſe veſſels, terminating by a common canal in the middle of the large inteſtine. The larvæ and the perfect inſects have the ſame ſtructure in theſe genera. This reſemblance ſeems moreover to exiſt, with reſpect to the hepatic organs, even in orders where the metamorphoſis is the moſt complete in all other parts; the number at leaſt is not changed. It is conſiderable in the hymenoptera, but generally amounts only to two in the coleoptera. In the latter they are generally found parallel to the inteſtinal canal, and make numerous windings. Their inſertion is immediately after the ſtomach in the larvæ of the ſcarabæi, the dytiſci, the carabi, &c.

The caterpillars and the perfect inſects produced from them have two, each of which is ſub-divided into three, placed in the former, at the ſides of the poſterior half of the canal, and forming their principal folds completely in the back of the body. Among the hemiptera, the nepæ ſeem to have only two. The larvæ of the ſtratyomys and ſyrphus, of the order diptera, have four, which end in the inteſtine by a common trunk.

Coverings and Supports of the Alimentary Canal.—We have mentioned already that the ſtomach of the cruſtacea is ſupported in its ſituation by its muſcles; the remainder of the canal is maintained only by veſſels, and by the compreſſion of the ſurrounding parts.

In the proper inſects, the inteſtinal canal is retained in its place by the tracheæ only; there is neither meſentery veſſel nor cellular ſubſtance; conſequently when an inſect is opened and placed in water, all the folds of its canal riſe, and are developed from the ſpecific tightneſs derived from the air in the tracheæ.

The fine membrane lining the abdomen, and enveloped by the rings of the ſkin and their muſcles, may be called peritoneum.

But the moſt remarkable circumſtance belonging to inſects in their larva ſtate, and exiſting in them excluſively, among all invertebral animals, is the portions of cellular texture filled with fat, which may be compared to omenta, and may have the ſame functions. They ſeem particularly deſigned to ſupply the materials of nutrition to the animal, during all that time, in which, as a chryſalis, it eats nothing, as the fat of the omenta ſupports life in thoſe quadrupeds, which paſs the winter in a lethargic ſleep. When the animal changes its coverings and its form, and becomes a perfect inſect, theſe fatty organs probably furniſh the prodigious quantity of materials, which the ſudden developement of ſo many parts muſt require; conſequently they are not found in the latter ſtate.

The forms, colour, and conſiſtence of theſe maſſes vary. In the caterpillars they are oblong, ſwollen, full of a white fat like cream. In the larvæ of the ſcarabæi they are large ſemi-tranſparent membranes, with many opaque and white grains; in thoſe of the flies and ſtratyomys they have a flaſhed appearance, like narrow ribbands irregularly joined. They are inconſiderable, or do not exiſt at all, in the larvæ of inſects, which undergo an incomplete metamorphoſis, which eat during their whole exiſtence, and never paſs into the chryſalis ſtate. In all the orders they receive numerous air-veſſels.

Abſorption in Inſects.—The nutritive fluid prepared in the alimentary canal is taken up by a particular order of veſſels, called abſorbents, in the four firſt claſſes of the animal kingdom; theſe convey it into the blood-veſſels, in which it paſſes to all the organs of the body. The application of the new matter furniſhed by digeſtion to the parts of the ſyſtem is performed in ſome other way in inſects, as they ſeem to have neither abſorbing nor blood-veſſels (excepting the cruſtaceous inſects).

Cuvier is of opinion that the nutritive proceſs is performed in this claſs by *imbibition.* We arrive, ſays he, at this concluſion by proofs of different kinds; ſome are direct, but negative; others ſupply only inductions; their union will probably ſuffice to produce conviction. In the firſt place, he continues, no veſſels are found in diſſecting inſects; I have ſought for them with the greateſt attention, and by the aſſiſtance of the microſcope, in thoſe organs, which in other claſſes contain them in the greateſt abundance, as the choroid coat of the eye, and the membranes of the inteſtinal canal; I have never found any thing like them, although the tracheæ and the nerves are very eaſily diſcovered, and the innumerable ramifications of the former may be traced with the naked eye. Lyonet, who has deſcribed and repreſented in the larva of the coſſus parts a thouſand times ſmaller than the principal blood-veſſels would be, could never diſcover any thing of that kind.

There is indeed in inſects an organ, to which many anatomiſts have given the name of heart; it is a membranous tube, continued through the whole length of the back, both in the larva and in the perfect ſtate, exhibiting alternate contractions and dilatations, which ſeem to paſs ſucceſſively from one extremity to the other; but, notwithſtanding this circumſtance, which ſeems to indicate an organ of circulation, this tube produces no branches, and we can neither attribute to it the functions of a heart, nor diſcover any other purpoſe to which it is ſubſervient. Laſtly, thoſe naturaliſts who have obſerved with the microſcope the tranſparent parts of inſects, have diſcerned only a fluid at reſt, bathing them on all ſides.

Such are the negative arguments on this ſubject; thoſe drawn from induction refer principally to two points; *viz.* the mode of reſpiration in inſects, and the form of the ſecretory organs.

In animals which have a circulation, it is continually collected in a central reſervoir, whence it is forcibly expelled to all parts; it always arrives at the organs from the heart, and it is always ſent to the heart before it comes back again. It may then have been modified from its ſource by the action of the air; and, in fact, before it is brought by the aorta and its ramifications to the parts which are to be nouriſhed by it, it circulates through the lung or gills. If this arrangement is not found in inſects, the reaſon probably is that their nutritive fluid is not contained in veſſels, that it does not come from a common ſource, and conſequently that it could not undergo any modification in a ſeparate organ before arriving at the parts. It continually and quietly bathes all the parts, which are to draw from it ſubſtances ſuited to their wants; the action of the air ſhould therefore reach it every where, and this point is very completely ſecured by the diſpoſition of the tracheæ, as there is no point of the body to which the fine ramifications of theſe veſſels do not penetrate, and where the air does not immediately exerciſe its chemical action; in a word, as the blood cannot go in ſearch of the air, the air is every where brought in contact with the blood.

The ſecretions of inſects are never performed by conglomerate glands; their organs conſiſt, in all caſes, as we have juſt ſeen in the example of the liver, of long and ſlender tubes, floating in the cavity of the body, without being connected together, or fixed in any way except by the tracheæ. This appears clearly to be a neceſſary conſequence, and therefore a very probable indication of the abſence of blood-veſſels. When the powerful agents of circulation exiſt, they convey with facility the nutritive fluid to the moſt remote points of the glands; the intertexture of the blood-veſſels forms a thick and cloſe tiſſue, in which the peculiar veſſels of the gland are placed. When, on the contrary, there is neither heart nor blood-veſſels, nor any force to impel the fluid towards the ſecretory organs, the latter require a more powerful attractive force; and as this can be exerted only by means of the tiſſue compoſing their ſides, it becomes neceſſary that they ſhould be unattached, looſe, long, and ſlender, in order to augment their ſurface.

Organs of Circulation in the Cruſtacea.—The heart of the cruſtacea decapoda is very differently formed from that of the branchiopoda. In the former it is oval, circumſcribed, and placed nearly in the middle of the thorax; in the others it is elongated, and extends from one end of the body to the other, ſo as to form apparently a connecting link between the heart of the decapoda and the dorſal veſſel of the other inſects. In this point of view it has led ſome naturaliſts into error: we ſhall, however, find a ſtructure which is more analogous to it in the red-blooded worms.

The decapoda (the crabs, lobſter, cray-fiſh, hermit crab, &c.) have an aortic heart, like that of the molluſca. It receives the blood from the branchiæ by a large veſſel, which lies longitudinally in the cheſt to receive this blood by lateral veſſels. Cuvier ſtates that this is the caſe in the hermit crab; but he thinks that in the lobſter the branchial veins form two trunks, which go directly to the two ſides of the heart. When one of the veins of the branchiæ is injected, the fluid arrives at the heart by the route juſt indicated. From the ſame poſterior part of the heart ariſes an arterial veſſel, which goes directly backwards, and ſupplies the organs of generation and the muſcles of the tail. The anterior portion produces other arteries, varying in number according to the ſpecies.

Each pedicle of the branchiæ contains two principal veſſels; an artery and a vein. The venous trunks all go to the heart; and, as we have already ſtated, by a ſingle trunk in the decapoda: but, in the branchiopoda, where the heart is elongated, they all terminate in it directly, ſo that a pair of veins enters at each ring of the body. The branchial arteries do not come from the heart. When the latter organ is injected, the fluid does not enter the branchiæ, although it will paſs eaſily from the latter to the heart. In the ſquilla faſciata, Fabr., Cuvier obſerved a large longitudinal vena cava, extending from one end of the body to the other, under the inteſtine, and conſequently on the oppoſite ſurface to that occupied by the heart. Its tiſſue is much thinner than that of the heart, and tranſparent, and it produces as many pairs of branchial veſſels as the heart receives from thoſe organs. This anatomiſt has very little doubt that the ſame veſſel will be found in the decapoda, but he had not examined them for this purpoſe ſince he firſt ſaw it in the other diviſion.

The circulation of the cruſtacea is then the ſame with that of the gaſteropodous molluſca; *viz.* a double circulation, of which the aortic ſyſtem only poſſeſſes a ventricle: and even this ventricle does not deſerve the name in the branchiopoda, it ſo much reſembles in them a veſſel by its elongated form. Under this point of view the circulating ſyſtem of theſe animals reſembles that of red-blooded worms.

The heart of the cruſtacea, even in the decapoda, has no auricle; and valves have not hitherto been obſerved in it

It is hardly neceſſary to ſtate, that the blood thrown by the heart into the arteries, paſſes through the veins into the vena cava.

The motions of the heart may be ſeen in the ſmall monoculi of this country, but their extreme ſmallneſs prevents us from following the diſtribution of the veſſels. The anatomy of the molucca crab is not yet known.

Circulation of Inſects.—All inſects have in their back a longitudinal veſſel, filled with a tranſparent fluid, and for a long time regarded as the heart, after the ſtatement of Malpighi, who deſcribed it in the ſilk-worm, and repreſents it as a knotted canal, that is divided at intervals by conſtrictions. He conceived that each dilatation was a particular heart, and that theſe different organs tranſmitted the blood to each other: but he remarked at the ſame time that the ſucceſſion of the pulſations was not regular, and that the fluid ſometimes took a retrograde courſe. Lyonet has given a better account of this dorſal veſſel. It is an uniform canal, proceeding from the head to the oppoſite extremity, and enlarging a little in its courſe, but cloſed at the two ends. It poſſeſſes on each ſide a certain number of tranſverſe muſcular faſciculi, ſomewhat in the form of wings, which are fixed by their oppoſite ends to the general covering. Its dilatations and contractions are produced by theſe, which are exterior muſcles, and not by its own tiſſue.

Lyonet aſſures us, that he has not been able to diſcover any veſſel produced from this, and proceeding into the body, although he has deſcribed tracheæ and nerves a thouſand times ſmaller than theſe veſſels muſt be if they exiſt. Cuvier has tried all known methods of injection, without any greater ſucceſs. Swammerdam indeed mentions that he injected ſmall veſſels from it in the grylli; but we cannot help entertaining doubts on this ſubject, until the experiment ſhall have been repeated with ſucceſs.

The dorſal veſſel of inſects cannot then in any manner perform the functions, nor deſerve the name of a heart. Perhaps, like all other parts of this kind in inſects, it is a ſecretory veſſel: but we are at preſent quite unable to determine what liquor it ſecretes, and for what uſe. Its contents are tranſparent, light yellow, viſcous, miſcible with water, eaſily dried, and then becoming hard and cracking like gum.

Beſides the analogy of its contractions, its ſituation might favour the idea of its being a heart. The latter organ is placed near the back in almoſt all the molluſca, and in all the cruſtacea; and this is the poſition of an organ, which can hardly be regarded in any other light than as a heart, in the arachnidous inſects (araneæ, phalangia, and ſcorpions). It may be obſerved very eaſily in the ſpiders: and may be ſeen beating through the integuments of the abdomen in the ſpecies which have ſmooth bodies. On removing the integuments we expoſe a hollow oblong organ, pointed at its two ends, and advancing as far as the thorax by its front end: two or three pairs of veſſels very manifeſtly paſs off from its ſides. If we add to this account, the fact, that the ſpiders have no tracheæ, but that their reſpiration is circumſcribed within a ſmall number of veſicles, and that they appear to have glands, we ſhall be induced to believe that their circulation is more complete, and more analogous to our's than that of other inſects.

Reſpiratory Organs.—The claſs of inſects exhibits two very different arrangements of the organs belonging to this function: the cruſtacea have gills, reſembling thoſe of fiſhes and of many molluſca; other inſects have air-veſſels diſtributed to all parts of their bodies. The branchiæ of the former extract air from the water in which they live, in the ſame way as the gills of fiſhes act. The reſpiration of inſects produces in the air the ſame effects as that of the warm-blooded animals. Experiments ſhew us that oxygen is conſumed in this caſe, and that the reſidue of the air is rendered impure, by the admixture of carbonic acid gas.

An important reſult of reſpiration ſeems to be the maintaining the irritability of the moving powers: hence the definitive reſult of this proceſs, with reſpect to the fibre, is power in executing the motions which it has to perform. Thus the energy of the motive force will be in proportion to the quantity of reſpiration. The organization of inſects corresponds to this theory: they are the only claſs among the lower ranks of animated exiſtence, which poſſeſſes the faculty of flying, and we conſequently find the tracheæ carrying air over the whole body, ſo that reſpiration is carried on at all points. In thoſe inſects which do not fly, the force of the muſcles may be eſtimated by the rapidity of their other motions. The running of the millepede and the jumping of the flea, ſhew that they belong to a very irritable claſs of animals; the caſe is analogous to that of the oſtrich and caſſowary, which run with great celerity, although they are birds without wings.

Reſpiration of the Cruſtacea.—Their branchiæ are larger in proportion than thoſe of moſt of the mollusca. In the decapoda they are attached to the baſe of the feet, under the lateral and deſcending edge of the thorax, which confines them within a narrow ſpace. The branchiopoda have no gills in this ſituation, but under the tail, between the fins, and floating looſely in the water.

In the crabs the ſtructure is in ſome reſpects peculiar. Each gill repreſents a triangular elongated pyramid, attached by its baſis only, and having the point directed upwards. The middle of the pyramid is divided by a plane, proceeding from the apex to the baſis, and compoſed of a double membrane; and the body of the pyramid is formed by a large number of plates placed one over the other, perpendicular to the vertical plane juſt mentioned, and conſiſting merely of doublings of the double membrane. A large veſſel runs along each of the two longitudinal edges of this plane, and penetrates at its baſis into the thorax of the animal; one of theſe is arterial, and the other venous. If we inflate them, immediately all the ſmall laminæ which compoſe the pyramid are diſtended with air. In the ſame way the blood is expanded over all the ſurfaces, and is thus favourably diſpoſed for the action of the water.

There are ſeven of theſe pyramids on each ſide. As the edge of the thorax, which embraces and confines them, is inflexible, a particular mechaniſm became neceſſary for renewing the water which waſhes the ſurface of the organs. This effect is ſecured by two plates of a ſubſtance reſembling parchment, articulated on the cheſt near the maxillæ, very elongated, and paſſing obliquely, the one within, between the branchiæ and the body, the other without, between them and the edge of the cheſt. By compreſſing the branchiæ, theſe plates ſqueeze the water from the intervals of the laminæ, and when the preſſure is remitted, they allow the introduction of a new portion of fluid.

The branchial pyramids, although placed in a ſimilar ſituation, are more numerous and complicated in the decapoda with long tails, as the lobſter, cray-fiſh, and palinurus, Fabr. They have rows of cylindrical filaments, inſtead of laminæ, piled on each other on the two ſides of the vertical plane; ſo that their ſurfaces reſemble the ſhag of velvet. There are ſeveral thouſands of theſe filaments in a pyramid; each of them is formed of an artery and a vein united: each pyramid has two, its large artery and large vein ending in the body.

Theſe villous pyramids of the long-tailed decapoda are arranged in groups, between vertical laminæ, of which one aſcends behind each group. Theſe laminæ are attached to the firſt articulations of the feet, which cannot move without moving them, and without either compreſſing or ſetting free the branchiæ. The lobſter and cray-fiſh have five groups of four pyramids each, and a ſolitary one before and behind, of which the anterior is very ſmall. This will make twenty-two gills on each ſide. The firſt group is attached to the moſt exterior pair of maxillæ: and the ſolitary pyramid in front to the pair concealed by the former. The ſecond group is connected to the claws, and the others to the following feet, except the laſt, which has only a ſolitary pyramid. In each group the exterior pyramid is attached to the pedicle of the parchment-like plate, and moves with it: the three others adhere to the body of the animal, and have no ſeparate motion. The firſt ſolitary pyramid is alſo attached to its plate; but the laſt is fixed to the body, and has only a rudiment of a plate behind it. Moreover, two other plates are attached to two maxillæ, anterior to thoſe of which we have already ſpoken, and ſupport no gills: yet they are placed obliquely againſt theſe organs, and contribute to their compreſſion and relaxation. The action of all theſe plates occaſions the expulſion at the two ſides of the mouth of all the water in contact with the branchiæ.

The tail of the branchiopoda, particularly of the ſquillæ, bears on its under ſurface five pairs of fins, forming broad membranous and ciliated oars, divided into two large lobes, an exterior, which is rather anterior; and an interior, which is a little poſterior. The gill is attached to the root of the firſt at its inner edge. It conſiſts at firſt of a conical pedicle compoſed of the two large veſſels: from this proceeds a row of cylindrical tubes, gradually diminiſhed in ſize from the baſis towards the apex: each of theſe is curved, and forms a long conical and flexible tail, which alſo ſupports a very numerous row of long and looſe filaments. Each gill contains a very conſiderable number of theſe, and reſembles, on the firſt view, a large bruſh: it is only by ſeparating the filaments that the regularity of their inſertion and ſucceſſion can be perceived. It is almoſt unneceſſary to add that each filament contains two veſſels; and that each tail and each tube has the ſame vaſcular arrangement, juſt as in the general pedicle. The branchiæ float in the water, are moved like the fins, and are even agitated between the two lobes of the latter: conſequently no mechaniſm is required for renewing the water in contact with them.

Tracheæ and Reſpiration of Inſects.—Some remarks on this ſubject will be found in the article ENTOMOLOGY, under the diviſion *Stigmata.* We ſhall enter here more minutely into the anatomical details.

We have already ſtated that the ſurrounding element, the air, diſtributed by means of an infinite number of tubes, exerts its action on all points of the interior of the body. Theſe canals have been called tracheæ, on account of their analogy to the trachea or large veſſel which conveys air into the lungs of ſuch animals as poſſeſs thoſe organs. Their ſtructure is remarkable: they are compoſed of three membranes, an internal and an external one of the common ſtructure; and a middle one compoſed of an elaſtic thread, poſſeſſing a fine metallic luſtre, rolled ſpirally, or in a double ſpiral courſe round the canal, from one extremity of the tube to the other, and admitting of being unrolled with a little addreſs. By this the ſides of the tube are conſtantly maintained circular, ſo that the paſſage of the air is always free. Yet all the tracheæ are not provided with this part in their whole length: ſome, which Cuvier calls veſicular, are dilated at certain intervals, ſo as to form merely membranous pouches not provided with this elaſtic ſupport.

The tracheæ communicate externally by ſmall lateral holes pierced on each ſide of the body, and called ſtigmata; or ſometimes by one or two tubes opening into the anus. The latter ſtructure belongs to the true aquatic inſects; ſome of which, as the larvæ and chryſalides of the libellulæ, have in the rectum a particular apparatus for this purpoſe, which we ſhall deſcribe.

The tracheæ of the larvæ do not reſemble thoſe of the perfect inſects any more than the other organs: indeed the differences in this reſpect are often ſtill more ſurpriſing.

We ſhall deſcribe the organs ſucceſſively in the moſt remarkable families.

Thoſe of the caterpillars are the beſt known, through the admirable deſcription given by Lyonet of that inſect. A nearly cylindrical tube, receiving air by ten ſtigmata, extends on each ſide of the body. Its branches go off in a radiating manner, from points exactly correſponding to the ſtigmata; thoſe at the beginning, which go to the head, are larger than the ſucceeding ones. We obſerve here, once for all, that no part is unprovided with theſe air-veſſels, and that the very membranes of their trunks even receive ſmall branches. In the caterpillar they are ſtrong, opaque, and of a fine ſilvery colour, which, however, depends in part on the contained air; for the brilliancy is loſt, both here and in other families, when they are macerated and filled with water or ſpirits of wine. The air-veſſels of the butterflies, produced from theſe caterpillars, have a very different appearance; they are thinner, leſs numerous, and poſſeſs almoſt throughout ſmall yellow or white elliptical bodies of a fatty nature: ſuch at leaſt is their appearance in the atalanta and the phalæna pavonia.

A much more conſiderable change is obſerved in the coleoptera lamellicornia: the larva has faſciculi of cylindrical, ſilvery, and very fine tracheæ, diſtributed from each ſtigma over the ſurrounding parts. In the perfect inſect they are of a dead white, ſwelled every where into ſmall oval or irregularly-figured veſicles, with very thin ſides: they reſemble trees much loaded with leaves. Examples of this arrangement may be ſeen in the melolonthæ, the ſcarabæi, the coprides, the lucani, &c.: and it occurs in no other families.

The hymenoptera and the diptera have two large veſicles at the baſis of the abdomen, and ſome ſmall ones: but the number is always inconſiderable.

The hydrophilus piceus has four large ones at the baſis of the abdomen; and, as this is a ſtrictly aquatic inſect, they may aſſiſt the animal, as the ſwimming-bladder of fiſhes does, in raiſing or depreſſing itſelf in the water.

The principal air opening in the aquatic larvæ is generally near the anus, that they may the more readily reach the air: in this caſe the two lateral trunks of the tracheæ are of great ſize, apparently for the purpoſe of holding a larger ſupply of the fluid; and the branches go off in the form of ſlender cylindrical threads. This arrangement is found in the larvæ of two very different families, the hydrophilus and ſtratyomys. The latter, as all the aquatic larvæ of the diptera, can elongate its tail conſiderably in ſearch of air without elevating the body; the anus is ſurrounded by ſmall tracheæ in the form of radii. Theſe inſects ſuſpend themſelves at the ſurface of the water by means of their tails.

The larvæ of the libellulæ exhibit the moſt ſingular diſpoſition of the reſpiratory apparatus. The orifices, which abſorb the air, are found in the rectum, under the form of very ſmall tubes, ranged in little groups in ten rows, which repreſent ſo many long pinnated leaves. A number of ſmall tracheæ, equal to that of the tubes within, paſſes from the rectum into the body; and theſe terminate in four trunks extended through the whole length of the body. Two of theſe are of vaſt ſize, and appear to ſerve as reſervoirs; for they ſend the air which they contain by tranſverſe branches into the other two ſmaller trunks, which proceed as uſual along the ſides of the body, and ſupply all parts with air-veſſels. Each of them produces a recurrent branch, which, after having croſſed the correſponding one, proceeds along the inteſtinal canal, and gives it an infinite number of ſmall ramifications. Cuvier thinks that the air contained in theſe different trunks follows a determinate courſe, relative to the occaſions of the parts to which it is diſtributed. The four trunks and the two recurrent branches are found in the perfect libellula; bnt they no longer derive their air from the anus. As the animal lives in the atmoſphere, its tracheæ are ſupplied from ſtigmata, near each of which is a veſicle, ſerving probably as a reſervoir. There is alſo a ſingle row of larger veſicles along the back.

The tracheæ appear to be deficient in ſome inſects, that is, in the arachnida, where we have ſtated that ſomething like a heart is perceptible. There is however a ſingle ſtigma at the baſis of the abdomen in the ſpider: but it leads only into a veſicle, from which no air-veſſels have been traced. Can this be the lung? and are there blood-veſſels diſtributed on its ſides?

Organs of the Voice.—By the voice we underſtand the ſound produced by animals in expelling air from their lungs, through the glottis: in this ſenſe it can be poſſeſſed by thoſe animals only which have lungs, as the mammalia, birds, and reptiles. Several inſects produce ſounds, and often very conſiderable ones, by the motions of various parts of their body: but there are no expreſs organs for this purpoſe. By theſe ſounds they invite each other, and expreſs their wants or their paſſions.

Organs of Generation.—Many very ſtriking peculiarities are obſerved in the propagation of inſects. The two ſexes of one and the ſame ſpecies are often ſo extremely unlike each other, that they would rather be taken for completely different ſpecies, than for animals that could pair together. Among the bees and other neighbouring ſpecies, the greateſt number of individuals have no ſex; they are conceived and born without being deſtined, as in the ordinary courſe, to conceive or produce impregnation. Their copulation is performed in a very extraordinary manner in many inſtances. The act is performed on the wing, and ſome are winged only during the ſhort ſeaſon of copulation. Several copulate only once, and the act is very ſoon followed by death: the life of the animal may be prolonged by deferring the copulation.

In ſeveral, as the cochineal inſect (coccus cacti), and the chigger (pulex penetrans), the pregnant female increaſes to an enormous ſize. The abdomen of the white ant (termes fatalis), when ready for laying, is calculated to be two thouſand times larger than it was before impregnation.

Organs of Generation in the Cruſtacea.—Theſe among the invertebral are what ſerpents and lizards are among the vertebral animals; their exterior organs are double; but, which is peculiar to themſelves, their internal organs, both teſticles and ovaries, are ſometimes united into one.

The decapoda in general have two peniſes and two vulvæ: the openings of the latter are found at the baſis of the third pair of feet. The two peniſes are quite at the back of the thorax, behind the fifth pair of feet: in this ſituation there is, on each ſide, a horny, pointed, tubular piece, opened longitudinally, which may be introduced into the vulva, and conducts the penis which paſſes through this tube. We ſee in the male, on the inſide, two very tortuous vaſa deferentia, each of which is continued to the root of the penis of its own ſide. In the lobſter and cray-fiſh the two canals proceed from a teſticle divided into ſix lobes, ſituated under the heart, behind the ſtomach, and between the two maſſes of hepatic veſſels. The teſtis is whitiſh, and has a glandular appearance. In the crabs the two canals are very large near the peniſes, become afterwards ſlender, and are ſo convoluted as to form the appearance of a gland on each ſide. Theſe glands are not united.

In the common lobſter the two ovaria are joined, ſo as to form a ſingle one to all appearance. The two oviducts are ſhort, ſtraight, and go directly to the vulvæ: the latter are ſimple holes pierced in the ſubſtance of the corſelet, near the third pair of feet in the crab, and in the very baſis of this third pair in the lobſter and hermit crab.

The female cruſtacea attach their eggs, after laying them, to the filaments of the fins under the tail, and carry them in that ſituation until they are hatched.

Organs of Generation in the proper Inſects.—The external parts are ſimple, and placed at the poſterior extremity of the body in moſt inſects. To this rule there are ſome exceptions, both in number and poſition. In the ſpiders they are double; and the male organs are placed on the maxillary palpi; the phalangia have a ſimple male organ, coming out from the root of the abdomen.

The libellulæ have the male organ at the baſis, and not at the point of the abdomen; and hence ariſes their very ſingular attitude in copulation. The male ſeizes the neck of the female with the hooks at the extremity of his abdomen, until the female bends herſelf back, and brings the extremity of her own abdomen to the baſis of that of the male.

The generative organs of the iuli are about the middle of the body.

I. *Male Organs.*—Theſe conſiſt in general of a penis with its coverings, of a common ſpermatic canal, and of two pairs of organs, which may be regarded as teſticles and veſiculæ ſeminales. Each of theſe pairs may be more or leſs ſubdivided; they vary in figure and in ſize.

1. *In the Coleoptera.*

a. In the Lamellicornia.—The genera ſeparated from the ſcarabæi of Linnæus, as the melolonthæ, cetoniæ, trichiæ, ſcarabæi, &c. have numerous globular teſticles and veſiculæ in the form of tubes, as ſlender as threads, and exceſſively long. In the ſcarabæus naſicornis, for example, the two veſiculæ ſeminales are more than twenty times the length of the body, and are convoluted into a packet or maſs, which it is not very difficult to unravel. Their tube is a little enlarged before it joins the common canal. On each ſide there are ſix teſticles of a ſmall ſize, and producing each an excretory tube more ſlender than a hair: theſe ſix ſmall tubes are united into one canal, which is joined to that of the oppoſite ſide preciſely at the point where the veſiculæ ſeminales are united. The common canal, reſulting from theſe four tubes, becomes large and muſcular, and then goes into a horny ſheath, terminated by a kind of pincers, between the laminæ of which the penis is placed. The latter is merely a ſmall cylindrical tube. It appears that the two branches of the pincer are introduced into the vulva, and then ſeparated ſo as to facilitate the entrance of the penis. Swammerdam has given a very accurate figure of theſe parts.

The melolontha reſembles the S. naſicornis.

The organs are more complicated in the cetonia: there are twelve teſticles on each ſide, and, beſides the filiform veſiculæ, which are probably thirty times as long as the body, there are two other ſhort and thick pairs; the ſhorteſt of the latter has its extremity forked. The canals of the three pairs of veſiculæ, as well as the canals of the two groups of teſticles, join together at the ſame point to conſtitute the common ſpermatic tube, which goes to the penis.

The trichiæ reſemble the cetoniæ.

The coprides, or dung beetles, and the lucani, or ſtag beetles, do not follow the ſame type: they have only one teſticle on each ſide, and this is a globular and compact maſs made up of the convolutions of a ſingle tube. Their veſiculæ ſeminales are alſo filiform, but not ſo long in proportion as thoſe of the ſcarabæi.

b. In the Carnivora.—The organs are very ſimple in the dytiſcus; there are two large veſiculæ of moderate length, very little convoluted; two globular teſticles covered by a yellowiſh matter, which may be removed; they are then eaſily unravelled into a ſingle, filiform, ſlender and long veſſel. The vas deferens is merely the continuation of this: it enters the veſicula a little before that joins the oppoſite tube to form the common ſpermatic canal.

c. In the Clavicornia.—The ſtructure of the hydrophilus is more complicated than that of the dytiſcus: it has two oval teſticles, each of which is formed by the convolutions of a ſingle veſſel. The vas deferens, which is as fine as a hair, ſwells into a ſmall oval veſicle where it ends in the common canal. The principal veſiculæ ſeminales are large, with ſtrong ſides, ſpirally convoluted, and terminating ſuddenly in a ſmall veſſel folded in zig-zag, and forming the appearance of another ſmaller teſticle. There are, moreover, two acceſſory veſiculæ, with thin ſides, each divided into three branches, and into ſome ſmall blind appendices. The common ſpermatic canal has a muſcular enlargement towards its middle, and becomes again ſuddenly ſmall to enter the penis. Theſe parts are figured by Swammerdam, but rather rudely.

The ſilpha atrata has two large oval teſticles, formed of an infinite number of ſmall ſhort veſſels, reſembling thoſe bruſhes of which the hairs project in every direction. The vas deferens is ſmall and ſhort. There are two pairs of veſiculæ, both cylindrical and tolerably large; one of them is folded in a ſerpentine manner round the inteſtine, and may be four or five times the length of the body: the other is much ſhorter. The common ſpermatic canal is cylindrical and ſhort. The penis is alſo cylindrical, covered with horny pieces, but has no pincer. An oval bladder, of which the uſe is unknown, but which reſembles in its poſition and figure the urinary bladder of the mammalia, is found at its internal baſis.

d. In the Filicornia.—The common ſpermatic canal is eight or ten times the length of the body in the blaps mortiſaga; four organs reſembling veſiculæ are connected to it at its origin. Two of theſe firſt make ſome very regular ſpiral turns, growing at the ſame time ſmaller; and then enlarge again and are irregularly folded. The two others have a zig-zag courſe, and are much ſhorter.

2. *In the Orthoptera.*—The grylli have two conſiderable oval teſticles attached to the back: they are covered by a yellow mucoſity, in which the tracheæ may be ſeen beautifully diſtributed. They are compoſed of ſmall ſhort veſſels, which make up a kind of bruſh. The vas deferens is folded in the form of an epididymis: a little before joining the oppoſite one, to form the common canal, it is enlarged, becauſe it receives two groups of veſiculæ. One of theſe contains more than ſixty, and the other above two hundred much ſmaller than the former. The four bundles fill nearly half the abdomen. Two ſmall oval veſicles are found at the very point of union of the two vaſa deferentia.

3. *In the Hemiptera.*—The water ſcorpion (nepa ſcorpioides) has two ſmall, ſhort, and cylindrical veſiculæ, two large vaſa deferentia convoluted like the epididymis, and divided at their origin, each into four ſmall teſticles, each of which is again prolonged into a very long filiform veſſel. Theſe eight veſſels are convoluted into a maſs.

4. *In the Lepidoptera.*—There are two different forms in this order: the bombyx pavonia will ſerve as an example of one, and the ſame has been imperfectly exhibited by Swammerdam and Malpighi in the ſilkworm moth (bombyx mori). The common ſpermatic canal is divided into two veſiculæ ſeminales, at firſt a little enlarged, and then prolonged in the form of tubes. They continue united to each other in half their length. The vaſa deferentia enter in a very ſlender form into the ſwellings of the veſiculæ. They gradually enlarge, and terminate on each ſide in a maſs, which may be regarded as a teſticle. Malpighi has repreſented the veſicles broken a little above the inſertion of the vaſa deferentia; and Swammerdam a little beyond this point. The teſticles are ſmaller in the pavonia than in the bombyx mori.

The ſecond form may be exemplified in the ſphinx euphorbiæ, and it is juſt the ſame as Swammerdam repreſents in the papilio urticæ. The common canal, much longer, is divided into two long and ſlender veſiculæ, each of which is joined by a vas deferens: but the two laſt, inſtead of having ſeparate teſticles, are united into a ſingle rounded maſs

The preceding are the ſpecies of inſects, in which Cuvier has hitherto obſerved the male organs: there are three others in Swammerdam, which agree with theſe in the principal points.

The bee, among the hymenoptera, has two large oval veſiculæ, two rounded teſticles, with long filiform vaſa deferentia. There are two ſhort and ſmall acceſſory veſiculæ: the common canal is enlarged before it enters the penis.

In the order diptera the ſtratyomys has two oval teſticles, formed, like thoſe of the ſilpha and gryllus, of ſmall veſſels; two vaſa deferentia, and two ſimple filiform veſiculæ. The common canal is of a middling ſize. In the fly, which lays in cheeſe, on the contrary, there is a very long common canal, very ſhort vaſa deferentia, and large oval veſiculæ divided into two lobes.

II. *Female Organs.*—Theſe are much more uniform than the male in the whole claſs. They conſiſt, in general, of a common oviduct, opening at the vulva, and divided at its origin into two branches, each of which is again divided into a certain number of conical tubes of various length. The ova are ſo arranged in the interior of theſe tubes, that the largeſt are the neareſt to the oviduct, and that the others gradually decreaſe in ſize to the point of the tube, where they are imperceptible. When the ova have been diſcharged, the tubes remain empty. They may be already diſcerned in the chryſalis, a little before the metamorphoſis. Secretory veſſels of various forms end in the oviduct, and depoſit in it fluids for covering the eggs or for forming a ſhell.

The ſcarabæus naſicornis has ſix oviferous tubes on each ſide, each containing five or ſix eggs: an oval veſicle and a ſmall but rather long veſſel end in the oviduct.

The carabi have ten or twelve tubes, and the dytiſci twelve or fifteen; the oviduct has a ſimple and ſmall bladder, which is prolonged further in the carabus.

In the ſilpha atrata there are ſeven or eight tubes, and each contains four eggs. The latter do not become large until they arrive in the branches of the oviduct, which are of conſiderable ſize.

The tubes are very numerous in the hydrophilus, and form two large branches; round the baſis of each of theſe are five long and large ſecretory veſſels containing a green liquor.

The butterflies have on each ſide four very long tubes, filled with a large number of eggs, and forming, particularly in the fruitful ſpecies, rows like ſtrings of beads, four or five times longer than the body. The common oviduct is ſo ſhort as to be ſcarcely perceptible; it receives one or two veſicles, and two long veſſels.

The grylli have on each ſide about thirty tubes, each of which does not contain more than three or four viſible eggs: they are united by the tracheæ, and by a mucous ſubſtance, into two oval maſſes. The common oviduct receives a veſicle and a long veſſel.

The bees have the two laſt mentioned parts: their rows of eggs are numerous on each ſide. Cuvier thinks that he can perceive very ſmall ones in the neuter bees, which would confirm the notion of their being imperfectly developed females.

In the ſilpha there are five, and in the notonecta ſix rows on each ſide.

The libellulæ have two very long branches; their tubes are ſhort, ſmall, and almoſt innumerable.

The various boring inſtruments which certain genera, as the gryllus, ichneumon, tenthredo, and cynips, employ for depoſiting their ova in ſuitable ſituations, may be arranged with the organs of the female ſex. But, as theſe parts are completely external, and have been well deſcribed by naturaliſts, we ſhall not ſay any thing more on the ſubject.

Spinning Inſtrument of the Caterpillars.—Almoſt all the caterpillars ſpin themſelves a covering, or at leaſt an attachment of ſome kind, before their metamorphoſis. The caterpillar of the bombyx mori is the moſt celebrated in this reſpect, ſince the thread compoſing its covering being abundant, flexible, brilliant, and eaſily wound off, forms the material from which our moſt ſplendid ſilks are formed. Other caterpillars, as that of the bombyx pavonia, form as large a quantity of ſilk, but it is hard, liable to break, and cannot be wound off.

The ſecretory organs producing the ſilk are the ſame in all caterpillars, excepting varieties in ſize, which is proportionate to the quantity of ſilk produced. Theſe, like all the other ſecreting organs of inſects, are two long tubes, commencing in a very ſlender and convoluted form; then growing larger to form a kind of reſervoir, and terminating in an excretory canal ſo ſmall that it can hardly be ſeen. The two canals terminate under the lower lip: and the animal draws out and elongates the ductile matter by moving its head from ſide to ſide.

Organs for producing Light.—Several animals of this claſs have the power of producing light; and the ſubſtance in which this property reſides is ſometimes diffuſed through the animal's body, ſometimes collected into a particular organ. The luminous matter muſt be regarded as an animal ſecretion produced like any other animal ſubſtance. A very full and intereſting account of this ſubject is contained in a paper by Mr. Macartney, in the Philoſophical Tranſactions for 1810, from which the following paſſages are extracted.

“ The power of emitting light has been obſerved in two animals of the cruſtaceous order, and ſeemed to reſide in the whole body. One of theſe, obſerved by ſir Joſeph Banks, in the paſſage from Madeira to Rio Janeiro, reſembled the common ſhrimp, but was leſs: it is named by Mr. Macartney cancer fulgens. The other was found in the Red ſea by captain Horſburg, appeared to be a monoculus, and to belong to the genus limulus of Müller. Mr. Macartney calls it limulus noctilucus. A third cruſtaceous animal of the genus lynceus of Müller, poſſeſſing luminous properties, has been ſeen off the coaſt of Malabar. Of other inſects ſome ſpecies yield light in the five following genera; *viz.* elater, lampyris, fulgora, pauſus, ſcolopendra;

dra. The only animals which appear to poſſeſs a diſtinct organization for the production of light are the four firſt of the laſt mentioned genera.

"The light of the lampyrides (glow-worm) is known to proceed from ſome of the laſt rings of the abdomen, which, when not illuminated, are of a pale yellow colour. Upon the internal ſurface of theſe rings there is ſpread a layer of a peculiar ſoft yellow ſubſtance, which has been compared to paſte, but by examination with a lens I found it organized like the common interſtitial ſubſtance of the inſect's body, except that it is of a cloſer texture, and a paler yellow colour. This ſubſtance does not entirely cover the inner ſurface of the rings, being more or leſs deficient along their edges, where it preſents an irregular waving outline. I have obſerved in the glow-worm, that it is abſorbed, and its place ſupplied by common interſtitial ſubſtance, after the ſeaſon for giving light is paſſed. The ſegments of the abdomen, behind which this ſubſtance is ſituated, are thin and tranſparent, in order to expoſe the internal illumination. The number of luminous rings varies in different ſpecies of lampyris, and as it would ſeem at different periods in the ſame individual. Beſides the luminous ſubſtance above deſcribed, I have diſcovered in the common glow-worm, on the inner ſide of the laſt abdominal ring, two bodies, which to the naked eye appear more minute than the head of the ſmalleſt pin. They are lodged in two ſlight depreſſions, formed in the ſhell of the ring, which is at theſe points particularly tranſparent. On examining theſe bodies under the microſcope, I found that they were ſacs containing a ſoft yellow ſubſtance, of a more cloſe and homogeneous texture than that which lines the inner ſurface of the rings. The membrane forming the ſacs appeared to be of two layers, each of which is compoſed of a tranſparent ſilvery fibre, in the ſame manner as the internal membrane of the reſpiratory tubes of inſects, except that in this caſe the fibre paſſes in a ſpiral inſtead of a circular direction. This membrane, although ſo delicately conſtructed, is ſo elaſtic as to preſerve its form, after the ſac is ruptured, and the contents diſcharged.

The light that proceeds from theſe ſacs is leſs under the controul of the inſect, than that of the luminous ſubſtance ſpread upon the rings: it is rarely ever extinguiſhed in the ſeaſon that the glow-worm gives light, even during the day; and when all the other rings are dark, theſe ſacs often ſhine brightly.

The organs for the production of light in the genus elater are ſituated in the corſelet; theſe likewiſe conſiſt of a peculiar yellow ſubſtance, placed behind tranſparent parts of the ſhell, which ſuffer the natural colour of this ſubſtance to be ſeen through them in the day, and when illuminated give paſſage to the light. On diſſecting the organs of light in the elater noctilucus, I found that there is a ſoft yellow ſubſtance of an oval figure lodged in the concavity of the yellow ſpots of the corſelet, which parts are particularly thin and tranſparent in this ſpecies. This ſubſtance is ſo remarkably cloſe in its texture, that, at firſt view, it appears like an inorganic maſs, but with a lens it is readily perceived to be compoſed of a great number of very minute parts or lobules cloſely preſſed together. Around theſe oval maſſes the interſtitial ſubſtance of the corſelet is arranged in a radiated manner, and the portion of the ſhell, that immediately covers the irradiated ſubſtance, is, in a certain degree, tranſparent, but leſs ſo than that which lies over the oval maſſes: it is therefore probable that the interſtitial ſubſtance in this ſituation may be endowed with the property of ſhining. In the elater ignitus the maſſes of luminous ſubſtance are extremely irregular in their figure; they are ſituated nearly at the poſterior angles of the corſelet, and are more looſe in their texture than the oval maſſes of the noctilucus, reſembling rather in compoſition the interſtitial ſubſtance which ſurrounds theſe maſſes in that ſpecies. The ſhell of the corſelet is ſomewhat thinner, and more tranſparent along both ſides of the margin, than at other places, but it is not, as in the noctilucus, elevated, and peculiarly clear and thin immediately over the ſeat of the luminous organ; conſequently the light emitted by the elater ignitus cannot be very brilliant."

In the fulgora candelaria and lanternaria, Mr. Macartney has found the hollow organ, from which the light proceeds, to communicate freely with the external air, by means of a chink or narrow aperture, placed on each ſide of the root of the proboſcis. This organ is lined by a membrane, between which and the horny part or ſhell there appears to be interpoſed a pale reddiſh ſoft ſubſtance, arranged in lines or ſtripes in the candelaria. It could not be determined, whether this furniſhes the light, or is the pigment, upon which the colour of the proboſcis depends.

The globes of the antennæ conſtitute the organs of light in the pauſus ſpherocerus.

"It is worthy of remark," ſays Mr. Macartney, "that in all the diſſections I have made of luminous inſects, I did not find that the organs of light were better or differently ſupplied with either nerves or air-tubes, than the other parts of the body. The power of emitting light likewiſe exiſts in many creatures, which want nerves, a circumſtance ſtrongly marking the difference between animal light and animal electricity." Swammerdan's Book of Nature, or Hiſtory of Inſects: Lyonet Traité Anatomique de la Chenille, qui rouge le bois de ſaule: Cuvier Leçons d'Anatomie comparée.

Insects *infeſting the human body*. The paraſitic animals, which are moſt commonly found inhabiting, and deriving their nutriment from, the internal cavities of the human body, are the three ſpecies of worms, which are denominated, by naturaliſts, *aſcaris*, *lumbricus*, and *tænia*; that is, the maw-worm, or thread-worm, round-worm, and tape-worm; to which may be added the *trichuris*, which is occaſionally ſeen. (See theſe words.) The external parts of the body, again, afford a nidus and ſuſtenance to one or two of the inſect tribes, eſpecially the *pediculi* of the head and of the *pubes*; the former of which are ſometimes bred in great numbers, and infeſt other parts of the ſurface, producing a loathſome and very obſtinate diſeaſe, the *morbus pedicularis*, or louſy diſeaſe. (See Phthiriasis and Prurigo.) It is not our object, however, to treat of theſe under the preſent article; but merely to notice briefly the occaſional exiſtence of various ſpecies of the *winged inſects*, in the different cavities of the human body, eſpecially in their firſt ſtate, that of *larva*, caterpillar, or grub; and to point out the manner in which they are probably introduced.

The medical writers of the ſixteenth and early part of the ſeventeenth century have recorded inſtances of various reptiles and other animals, which were diſlodged from their abode in different parts of the body, ſuch as frogs, lizards, ſerpents, &c.; which may be found on conſulting the collections of Borelli, Marcellus Donatus, Schenck, and others. But their credulity was at leaſt equal to their learning and induſtry, and ſubſequent obſervation has not confirmed their ſtatements, which probably originated from groſs ignorance of the economy of theſe creatures, or from wilful deception on the part of thoſe from whom they were ſaid to have been diſcharged. On the other hand, the microſcopic philoſophers not only peopled every organ of the body with worms and animalcules; but believed that all contagion conſiſted of the ſame beings, which, according to their nature, communicated ſcabies, and ſyphilis, ſmall-pox, dyſentery, the plague, and every other infectious diſorder. (See the learned diſſertation of Dan. Le Clerc, entitled "Hiſtoria Lator. Lumbricorum," p. 274, *et ſeq.*) But more accurate inveſtigation has likewiſe cauſed theſe notions to be exploded; and the catalogue of paraſitic creatures, which infeſt the human frame, in addition to the worms, &c. abovementioned, is reduced to a few varieties of the inſect tribes.

It is well known, that the internal cavities and paſſages of ſome animals, eſpecially the noſtrils and adjoining ſinuſes, the ſtomach, and *rectum* or ſtraight gut, in horſes, ſheep, and cows, are the ſituations in which alone certain inſects are apparently intended by nature to breed, and to be nurtured in their firſt ſtage of exiſtence. This is the caſe eſpecially with the ſeveral ſpecies of *œſtrus*, the grub or larva of which is called a *bott*. (See an ample hiſtory of this inſect, under the article Botts.) The *ova*, or eggs of theſe inſects are introduced into thoſe paſſages by the parent inſect, or are conveyed thither by licking with the tongue, inhaling odorous matters, &c. Now, although there does not appear to be any ſpecies of inſect deſtined particularly to be nurtured in the human body; yet it appears beyond all queſtion, that the larvæ of ſome of the winged inſects are occaſionally hatched and nurtured in the noſtrils and ſinuſes, as well as in the ſtomach and inteſtines of man.

The want of accurate inveſtigation, ſince the ſubject of entomology has been well underſtood, leaves us in a ſtate of uncertainty as to the number of inſects which are thus nurtured within the human body. It ſeems probable, however, as we might, perhaps, have anticipated, that the moſt frequent inſtances which occur, are thoſe of our moſt common domeſtic inſect, the varieties of *the fly*. The *larvæ* of ſeveral of the ſpecies of the fly (*muſca*, Linn.) are aquatic, or at leaſt inhabit moiſt and wet places, and therefore ſeem to be adapted to exiſt in the fluids of the human ſtomach: and the author of this article is in poſſeſſion of ſome larvæ of the common *houſe-fly*, the *muſca domeſtica minor* of Degeer (Hiſtoire des Inſectes, tom. v. tab. 2. fig. 4.), which were rejected alive from the ſtomach of a man by vomiting (ſee Edin. Med. and Surg. Journal, for Jan. 1811, p. 41.); and of others of the ſame fly, which were paſſed by ſtool by another perſon. The larva of another ſpecies of *fly* is alſo figured in the Journal, juſt referred to, by Dr. Cheyne, now of Dublin: and ſeveral examples of the larvæ of *flies*, diſcharged from the human inteſtines, are on record. Dr. Wahlbom, of Upſal, has related the caſe of a girl, who, after ſuffering conſiderable pain in the ſtomach and left ſide, diſcharged by ſtool a number of larvæ on ſeveral ſucceſſive days, after which ſhe was relieved from the complaint. "One of theſe larvæ, while it was kept in a phial, was converted into a *fly*, which proved to be the *muſca nigra* of Linnæus. (Faun. Suec. 1105.)" Dr. Wahlhom alſo ſtates, "that a few years ago there was a girl in Upſal, from whom a large quantity of worms were brought away, and theſe were *fly-worms*. N. Faun. Suec. 1064;" for an account of which he refers to Dr. Du Bois' Treatiſe de Tænia. (See Med. Chirurg. and Anatom. Caſes and Experiments, communicated to the Royal Academy of Sciences at Stockholm, tranſlated from the Swediſh, 1757, caſe 24.) Ruyſch has deſcribed and delineated both the larvæ, and the flies which originated from them, after they were diſcharged (it is affirmed) by urine, by a nobleman, in conſiderable quantities; and Tulpius has mentioned a ſimilar caſe, and has alſo figured the larvæ, which cloſely reſemble thoſe in the writer's poſſeſſion.

It muſt be acknowledged, however, that the bladder is the leaſt probable *nidus* for the larvæ of inſects, and we cannot readily conceive how they ſhould find their way into that cavity: while, on the other hand, miſtakes may be made upon ſuch a ſubject with the greateſt facility, as Valliſneri long ago remarked. Theſe larvæ might have crept or fallen into the utenſils, or the *ova* might have been depoſited there, and the larvæ afterwards obſerved in the urine. An inſtance of this kind of miſtake was related to the writer by an eminent ſurgeon. A lady was in great alarm, from the belief that ſhe frequently paſſed from the bowels ſeveral little red worms, extremely lively in their motions, which were found in the excretions. But it was ſtrongly ſuggeſted, that theſe worms muſt be inhabitants of the water-cloſet; and upon accurate examination, the ſuggeſtion was confirmed; they proved to be the larvæ of the *common gnat*, which are well known to be aquatic in their mode of life. In all caſes, therefore, it is neceſſary to be cautious in examining all the circumſtances, before it be concluded, that inſects, found in the excrementitious diſcharges, actually paſſed from the human body.

There is another ſpecies of inſect, which, in its ſtate of larva, or caterpillar, appears to be not unfrequently an inhabitant of the cavities of the human body, though not ſo commonly as the different ſpecies of fly; we mean the common *black beetle*, the *tenebrio molitor* of Linnæus. The grub of this inſect is a ſort of caterpillar, about an inch and a quarter in length, and equal to a large crow-quill in circumference, with ſix feet near the head, but deſtitute of feet at the other extremity: its body is divided into thirteen ſections. The introduction of this larva into the human body, or of the *ova* from which it is hatched, will be readily underſtood, when we mention that it lives principally in flour or meal; whence from the time of our oldeſt writer on inſects, Mouffet, it has been known by the appellation of the *meal-worm*. This writer has given a rude figure of the grub. (See his Inſectorum Theatrum, Lond. 1634, lib. ii. cap. 20. p. 254.) Two caſes, in which this meal-worm was diſcharged from the human body, have come to the knowledge of the writer of this article. (See Edin. Med. and Surg. Journal, above quoted.) Another is mentioned and figured by Dr. Kellie, of Leith, in the ſame Journal. And Tulpius has given a figure of the ſame larva, two of which, he ſays, were paſſed from the bladder of a woman of fifty years of age, and a ſimilar one from the noſe of another woman, who had previouſly ſuffered ſevere headache. (See his Obſerv. Med. lib. ii. cap. 51. tab. 7. fig. 3; and lib. iv. cap. 22.) The diſcharge of two from the bladder was probably inferred, by miſtake, from the grubs being found in the utenſil which received the urine: but the eſcape of the one from the noſe is probably correctly ſtated; for in this way the larvæ paſſed in one of the caſes, to which we have juſt alluded, and the noſe, or the adjoining cavities, are common receptacles for the ova or larvæ of other ſpecies of inſects, as we ſhall preſently ſhew. Foreſtus has recorded ſome caſes, in which the grubs were moſt probably of the ſame nature. He mentions the circumſtance, which he witneſſed, of a girl who rejected from the ſtomach two beetles, one at the interval of two days after the other, and likewiſe a living worm or grub, which was, in all probability, the grub of the beetle. He alſo mentions the ejection of a ſpecies of caterpillar, "vermem erucæ ſimilem," by vomiting, after which a ſevere pain of the ſtomach of conſiderable duration was removed. Foreſti Opera, lib. xxi. obſ. 25.

Several of the inſects above-mentioned were diſcharged from the noſe, in which cavity, in brute animals, the exiſtence of larvæ is very common, and the *ova* appear to be actually depoſited there by the parent inſect. Mr. Bracy Clark queſtions the exiſtence of human *botts* (*œſtrus hominis*); but that inſects of this ſpecies ſometimes find a *nidus* in the naſal paſſages of the human ſubject, is proved by a caſe, related by Dr. Heyſham, of Carliſle, in which three botts were diſcharged from the *antrum* of Highmore, or *ſinus* of the cheek of a woman, after that cavity had been perforated by a trocar. An intolerable hemicrania was occaſioned by their preſence, and ultimately proved fatal. (See Medical Communications, vol. i. art. xxx. and plate 1. figs. 2 and 3.) An example of a *centiped* lodging in the frontal *ſinus* is recorded in the Edin. Medical Eſſays, vol. v. p. 991. In tropical climates, as we learn from Dr. Lempriere, the maggots or *larvæ* of the large blue fly, which are conſtantly buzzing about the ſick, are generated in the noſe, mouth, and gums, in the laſt ſtages of fever, when the patients ſleep or doze with their mouths open, the nurſes finding great difficulty in preventing the depoſition of the *ova* in thoſe parts. This author mentions one inſtance, in the lady of an officer, who had eſcaped from the attack of fever, but in whom "theſe maggots were produced, which burrowed and found their way by the noſe through the *os cribriforme*, into the cavity of the cranium, and afterwards into the brain itſelf, to which ſhe owed her death." Lempriere, Obſ. on the Diſ. of the Army in Jamaica, vol. ii. p. 182.

It is probable that thoſe caſes on record, in which worms were ſaid to be coughed up from the lungs, were in reality inſtances of the larvæ of inſects, bred in the poſterior cavities of the noſe, and removed by the agitation of coughing into the throat, and thence expelled. See a caſe of this ſort, related by the late Dr. Percival, in his Med. Eſſays, vol. iii. p. 272, in which two maſſes of grumous blood were brought up by coughing, as large as a nutmeg, one of which, when opened, "was found to contain a conſiderable number of worms, like maggots, in a very lively ſtate."

Beſides the larvæ of *flies*, of the *black beetle*, and of the *œſtrus*, above-mentioned, ſcarcely any other inſects are deſcribed upon good authority, as being nurtured in the human body, if we except the *millepedes*, which are mentioned by ſome authors. It is impoſſible to ſay much on the ſubject of deſtroying theſe larvæ by medicine; ſince their exiſtence cannot be aſcertained before they are actually diſcharged and ſeen. The ſymptoms produced by the irritation which they excite, conſiſt only of ſevere pains in the parts where they happen to be, which of courſe cannot be diſtinguiſhed from pain occaſioned by other cauſes. If the exiſtence of the worms was known, or could be ſurmiſed, perhaps the internal exhibition of the oil of turpentine might be reſorted to with ſucceſs; for it appears that this liquor is poiſonous to all the inſect tribe, as well as to worms. Experience has now decidedly proved its efficacy in the deſtruction of the tape-worm. (See Edin. Med. and Surg. Journal, for April and July, 1810.) It has been uſed with ſucceſs in the way of glyſter in the caſe of aſcarides; and Dr. Lempriere found it ſerviceable when injected into the paſſages infeſted by maggots.

Insects, *Anatomical Uſe of.* The inſect-world affords us numerous uſes, and thoſe many of them ſuch as no one would at firſt thought imagine, and which no other operations or operators could ſo well effect. In the minutiæ of anatomy, where knives cannot be introduced, the maggot or the ant may be employed with great ſucceſs. Skeletons of fœtuſes have been prepared by burying them in an ant-hill, and that in ſo accurate and perfect a manner, that all who have ſeen them, have admired by what means they could be ſo nicely finiſhed; and the ſecret of the great Ruyſch, by which he cleared away the parenchymatous ſubſtance from his vaſcular preparations, was of this kind. After injecting the veſſels of any part with wax, all that remained to the completing of theſe preparations, was the taking off the parenchymatous or fleſhy matter from between and among them. Other anatomiſts of his time did this by the knife, or by maceration in water and other liquors; but it appeared a ſort of magic to them, that his were always not only much ſooner executed, but to a greater nicety and perfection than their's ever poſſibly could be. His method was only to put a number of the common fleſh-eating maggots to the ſubſtance; and theſe regularly eat away all the fleſh, their heads getting into crevices which no inſtrument could reach, and the whole ſubſtance of the injection remained unhurt, as their ſoft bodies could glide betwen its niceſt parts without injuring them; and the wax being no food for them, was in no danger of being eroded, even in its ſmalleſt pieces. The ſeveral ſizes of the worms or maggots bred from the eggs of different flies were of great uſe in the perfecting of the preparations; for while the larger ſort eat the more fleſhy parts, where the veſſels are large and but few in number, the middle-ſized maggots got into the interſtices of the more vaſcular parts, and the moſt minute of all, which are uſually alſo the moſt numerous, kept about the ſurface, and eat away between and among the capillary veſſels.

The maggots produced from flies are not the only animals fit for this kind of buſineſs. There are ſeveral ſpecies of beetles of the ſmaller kinds, whoſe eggs hatch into a ſix-legged worm, which eats as much and as nicely as the fly-maggots. All theſe may be employed very ſucceſsfully in the preparations of the parts of animals.

Theſe nice anatomiſts are not confined to animal ſubſtances; they often exert their power alſo on vegetables. Many of them feed on the leaves and fruits of plants; and ſome ſpecies of theſe work ſo nicely, that they eat away all the outer membrane and internal parenchymatous ſubſtance of the leaves, ſo as only to leave the net-like plexus of veſſels ſtanding. Yet theſe being unhurt ſhew the true figure of the leaf, and are a ſort of vegetable ſkeletons, but very poorly imitated by art in the common way, by long macerations in water; this method uſually deſtroying and waſhing away many of the ſmaller veſſels, which the tender mouths of theſe creatures ſpare. If they exert their ſkill often upon leaves in this manner, they do it alſo ſometimes with equal, if not greater, ſucceſs upon fruits. As in the leaves, thoſe which have the tendereſt parenchyma and the firmeſt ribs ſucceed beſt; ſo alſo it is in fruits. The leaves of the ruſcus or butcher's broom are often found thus beautifully anatomiſed; and of all fruits, none ſucceeds ſo well as that of the ſtramonium, or thorn-apple. Wherever this plant grows in any plenty, the fruit towards autumn, while it is yet full of juice, is attacked by a ſmall worm, which eats away all the parenchyma, and leaves every veſſel ſtanding in its place; and this not only in the outer coat of the fruit, but in the very inner cells of the ſeeds. Theſe veſſels remain exactly in the ſhape of the fruit, and, growing white with the air, exhibit the moſt elegant and beautiful ſkeletons imaginable, while yet ſtanding on the plant. The animal which effects this, is a hexapode worm produced from the egg of a ſmall beetle: and differs very little from ſome of thoſe which ſo elegantly eat away the fleſhy parts from the injected anatomical preparations. Theſe are gregarious animals like ſome ſpecies of the ſmaller caterpillars, and numbers of them are always at work together on the ſame leaf or fruit, ſo that the ſkeleton is ſoon made. They begin by piercing a number of little holes into the ſubſtance of the leaf, and thence burrow under the integument till they meet one another; and this being done all over the leaf, they leave it, and go to work upon another.

INSECTS, *Vegetable Diſeaſes of.* All ſuch vegetable affections or diſeaſes as are produced by different ſorts of animals of the inſect kind, are very numerous according to their nature and thoſe of the plants: but the chief inſects that affect plants of the fruit-tree kinds, are thoſe of the aphis, acarus, ant, chermes, cicada, coccus, earwig, papilio, phalæna, and thrips tribes.

And of the firſt ſort there are a vaſt number of ſpecies, each tree being ſaid to be infeſted by a different diſtinct ſpecies. Hence the author of the "Syſtema Vegetabilium" has denominated them from the trees on which they are found; as the cherry aphis, the currant aphis, the plum aphis, &c. The males are few in compariſon with the females, and have wings, while the latter are numerous and without them. See PUCERON, and VINE-FRETTER.

The ſecond is a highly deſtructive inſect in houſes where forcing is practiſed. It is not furniſhed with wings, but the female is oviparous. The ſpecies, as in the former caſe, are very numerous. It often commits great miſchief on vines, peaches, nectarines, cherries, forced kidney-beans, melons, &c. See *Red* SPIDER.

And the third, or ant, is highly injurious to fruits, eſpecially thoſe of the peach kind, as they become in a ſtate of maturity. They run all over the trees, and the beſt fruit is occaſionally filled with them. It has been ſuppoſed by ſome that they are of uſe by devouring the alphides on the trees; but Mr. Forſyth is of a different opinion, and we have ſeen fruit much ſpoiled by them in various inſtances.

The beſt method of deſtroying them, according to the above author, is, by making holes in the ground along the ſide of the wall where the fruit-trees are, by an iron crow, ſo that the inſide ſurface may be quite ſmooth. Theſe inſects, from being diſturbed, ſoon come to the holes, and fall into them; when, being prevented from getting up by the ſmoothneſs of the ſides, they may be readily deſtroyed by pouring water upon them. But more effectual methods are, either by mixing quick-lime with ſoot, and placing it on their tracks, or putting it in their neſts, and then pouring water, or urine and ſoap-ſuds, upon it, ſo as to ſlack it, confining the heat by a turf or ſome earth. The heat thus produced ſoon deſtroys them. The powder of ſtaveſacre, laid round the ſtems of the trees, is ſaid to prevent their running upon them and thereby becoming injurious.

The fourth, or chermes, belongs to the order hemiptera; and there are ſeveral ſpecies. Their ſpecific names are taken from the different plants on which they are generally met with: as the chermes graminis, or graſs bug; chermes ficus, or fig-tree bug, &c. The laſt is one of the largeſt of the genus, being brown above and greeniſh beneath, and has four long wings, placed in the form of an acute roof. The *larva* is of an oblong form, and has ſix feet, but its motion is ſlow. When attempted to be caught, the chermes makes its eſcape rather by leaping than flying, by means of its hinder legs, which play like ſprings. Several of the ſpecies are provided at the extremity of their bodies with ſmall ſharp-pointed implements, but which lie concealed; and theſe they draw out in order to depoſit their eggs, by making punctures in the plants that ſuit them. It is in this way that the fir tree chermes produces that enormous ſcaly protuberance which is ſometimes found at the ſummit of the branches, and which is formed by the extravaſation of the juices occaſioned by the punctures. The young larvæ ſhelter themſelves in cells contained in the tumour. Theſe inſects are capable of being deſtroyed in the ſame manner as the cocci tribe.

The fifth, or cicada, belongs to the ſame order as above, and the larvæ of many of this tribe void large quantities of frothy matter upon the leaves and branches of the plants and trees, in the midſt of which they are always concealed, probably for protection, and to be ſhaded from the ſame influence. Theſe inſects ſhould be deſtroyed, as the froth is unpleaſant, and the leaves of the trees are often devoured, by rubbing off the larvæ with the hand, and afterwards watering the trees well with ſoft water, ſuch as that of ponds or other expoſed ſituations.

The ſixth, or coccus, alſo belongs to the ſame order, and the males have wings, but the females none. It may be noticed, that the ſorts moſt commonly met with when full grown, have ſomewhat the form of a boat with the keel uppermoſt, being apparently without feet, eyes, &c. while in this ſtate reſembling ſome ſorts of galls or excreſcences of the bark of trees or other plants.

It has been obſerved by Mr. Forſyth, that a "thin film, of a white cotton-like ſubſtance, is interpoſed between the flat part of the body and the tree. This is common, in a greater or leſſer quantity, to all the ſpecies, and appears at firſt all round the edge as a kind of cement, to join it to the tree. The males are very few in proportion to the females, and not nearly one-fourth of their ſize; they are beautiful little flies, which, after a ſhort but active life, terminate their exiſtence without having taſted food, being provided with no ſort of organs for that purpoſe."

It is likewiſe remarked, "that the peach, nectarine, and pear-tree, are very much infeſted with theſe inſects: they frequently cut through the bark, and the trees then appear as if they had been ſcratched by cats." He has "ſeen ſome with this appearance all over them."

It is adviſed, that, "when theſe inſects firſt appear on the bark, they ſhould be ſcraped off with a wooden knife, and the ſtem and branches of the tree well waſhed with ſoap-ſuds and urine, applied with a ſtiff painter's bruſh. This ſhould be done in February before the buds begin to come out. But if the outer bark is perforated, it muſt be cut or ſcraped off with a long knife; and if you find any brown ſpots in the inner bark, they muſt be carefully cut out. This diſeaſe is, it is ſuppoſed, one great cauſe of the canker, and of the death of the tree."

And it is added, that "when this diſeaſe has made its way through both barks, as is often the caſe, the branches on each ſide of the tree may be cut cloſe to the ſtem, if it has an upright one; but if the tree be trained fan-faſhion, the beſt way is to head it near to the place where it was grafted." He ſtates, that he has "headed old pear-trees which were ſo dead, except a ſmall ſtrip of live bark on one ſide, that you might rub the bark off them as eaſily as off a bundle of faggot-ſticks that had been cut upwards of a year; yet theſe trees have ſhot out freſh branches to the length of ſeventeen feet in two years, and produced fine fruit the ſecond year." It is adviſed to apply the compoſition immediately after heading or cutting, or paring off the diſeaſed bark. See COMPOSITION.

It is further remarked, that "a very deſtructive ſpecies of the coccus tribe has done incredible damage to the apple-trees in the nurſeries and gardens in the neighbourhood of London. Some nurſerymen have loſt ſeveral thouſand apple-trees in one year. Theſe inſects attach themſelves to their bark by their ſuckers, and by feeding on the juices of the tree, rob it of its nouriſhment. Such trees as are infeſted with them have a ſickly appearance. Theſe inſects generally make their neſts where branches have been cut off, or in hollow places, where the canker has eaten holes in the trees. Their firſt appearance is like a white down; on touching or rubbing them they tinge the fingers of a crimſon colour, like cochineal. If ſuffered to remain long on the trees, they take wing, like aphides."

It is ſtated, by the ſame author, that the method that has been followed for theſe ten years to deſtroy them, is to "rub the places where their neſts are with an old bruſh, ſuch as painters uſe, till they are all cleaned off; and if the part be canker-eaten, to cut it clean out with a knife or chiſſel; he then takes of ſoap-ſuds and urine equal parts, and with this he waſhes the wound and the bark all round it; and with a bruſh applies the compoſition, mixed with wood-aſhes and the powder of burnt bones, covering the wound all over with it. Afterwards he ſhakes ſome of the powder of wood-aſhes and burnt bones, mixed with an eighth part of unſlacked lime finely powdered and ſifted over the hollows, or where knobs have been cut off."

And it is adviſed, that "at the ſame time that the trees are cleared of the cocci, the caterpillars ſhould be picked off."

The writer remarks, that "the firſt time that he obſerved the new coccus which has done ſo much miſchief to the apple-trees about London, was in a garden of his own at Chelſea, about the year 1782 or 3; and as far as he can learn, they were imported among ſome apple-trees, by the late Mr. Swinton of Sloane-ſtreet. Mr. Swinton afterwards removed his nurſery to the King's Road near Chelſea college, which now goes by the name of the Foreign Nurſery."

By ſome, train oil has been tried, laid on with a painter's bruſh, but without effect.

The ſeventh ſort, or earwig, is often very deſtructive to fruit, particularly that of the peach kind. The method recommended by Mr. Forſyth for deſtroying them, and which he has long purſued with ſucceſs, is to "take old bean-ſtalks, and cut them about nine inches long, tying them up in ſmall bundles with ſome pack-thread, or with ſmall yellow willows, and hanging them on nails againſt the wall, at different parts of the trees. The firſt thing in the morning, being provided with a board about eighteen inches ſquare, and a ſmall wooden trowel, take down the bundles of bean-ſtalks one by one, ſtrike them againſt the board, and with your trowel kill the earwigs as they fall out of the ſtalks. If you follow this up every morning, (or every other morning,) you will be able to keep them under," without much difficulty.

It is ſuggeſted, that this method anſwers for any ſort of trees infeſted with earwigs. In ſome years the writer has "ſeen a great part of the fruits, eſpecially the ſmooth-ſkinned ſorts, deſtroyed by theſe inſects, and a ſmall green caterpillar; and in a ſcarce year of fruit, the leaves of peaches are frequently deſtroyed by them." It is adviſed, that "the ſhreds taken from trees that have been unnailed in autumn, ſhould be ſoaked in boiling hot ſoap-ſuds for three or four days previous to their being uſed again; as this will kill the eggs of earwigs and other inſects that may be depoſited on them."

The eighth, the papilio or butterfly ſort, belongs to the order lepidoptera.

There are a great many ſpecies of this genus, moſtly diſtinguiſhed by the colour of their wings. The more common ſorts, with their caterpillars, are well known; and Mr. Forſyth adviſes, that the caterpillars and chryſalides ſhould be carefully picked off, and the trees well watered with clear lime-water and tobacco-water mixed well together. The ninth, the phalæna or moth kind, are extremely numerous, their caterpillars differing much in ſize, ſhape, and colour. After caſting their ſlough ſeveral times, all of them ſpin their cod, in which they are transformed to chryſalides. In this ſtate they are often found rolled up in the leaves of fruit trees, eſpecially thoſe of the pear, plum, and cherry kinds. See PHALÆNA.

And of the ſphinx, or hawk moth kind, there are a vaſt number of ſpecies. Their caterpillars apply the hinder parts of their bodies to the branches of the trees, holding the reſt erect; hence the name. But in general they ſpin their cod under ground. They appear early in the morning, or after ſun ſet, flying heavily, and making a ſort of noiſe. Several of the caterpillars are green, and ſome brown, yellow, ſpotted, or belted.

The phalæna nuſtria, or lackey moth, depoſits its eggs in rings or circles round the branches of fruit trees, having the appearance of a necklace. See PHALÆNA.

The tenth ſort, or thrips, belongs to the order hemiptera, and there are ſeveral ſpecies. It is extremely ſmall, ſo as ſcarcely to be diſcovered. This inſect produces great miſchief on fruit trees, devouring the fruit as well as the leaves. It is capable of being deſtroyed in a ſimilar manner to that of the cocci.

But the nature of the various effects of theſe different inſects, and the means of removing them, will be more fully conſidered and explained, in deſcribing the ſeveral vegetable diſeaſes that are produced by the attacks of different ſorts of animals of this kind. See VEGETABLE *Diſeaſes*.

INSECTS, *Petrified*, in *Natural Hiſtory*. The works of the earlier writers on extraneous foſſils, contain accounts of various inſects ſaid to be found in the earth. Mr. William Martin, a late and correct writer on this ſubject, ſeems, however, to doubt, whether the remains of any of the winged tribe of inſects have been found enveloped in the ſtrata; although ſuch inſects in a perfect and natural ſtate of preſervation are very common in pieces of amber. The limeſtone of Oening is ſaid by M. Werner to produce ſpecimens of the larvæ of the libellula or dragon-fly, and of the nepa or water-ſcorpion. Inſects without wings, of the cancer, monoculus, and oniſcus genera, are not uncommon in ſome ſtrata. In his "Petrificata Derbienſia," Mr. Martin deſcribes and figures (tab. 45.) an inſect found in the ſhale limeſtone of Aſhford and Bakewell Moor, which he calls the Derbyſhire oniſcite, and expreſſes an opinion, which ſeems pretty well founded, that it differs eſſentially from the oniſcite of the Dudley and Coalbrook-dale lime quarries. He alſo figures and deſcribes a lunated monoculite, ſaid to be found in iron-ſtone, near Mansfield, in Nottinghamſhire, but this probably is a miſtake, particularly if others of the ſame kind were found near Cheſterfield in Derbyſhire. The late ingenious Dr. Woodward had perſuaded himſelf, that all the many flies and inſects preſerved in amber, were of the vernal tribes, and concurred with other foſſil ſubjects in proving, that the Moſaic deluge happened in the ſpring ſeaſon of the year: later and more correct obſervations ſeem, however, to prove, that all the organic remains of the ſtrata, and even moſt of thoſe of the alluvia, cannot have relation to that event, ſince they differ eſſentially from the recent inſects, animals, &c. to which they have a reſemblance, and all ſuch ſeem rather to have been created and lived, during the ſucceſſive creation and depoſition of the mineral ſubſtances, compoſing the ſtrata in which they are imbedded, and long prior to the creation of the preſent race of animals and vegetables, of whoſe origin Moſes has given us ſo ſuccinct and ſatisfactory an account, as according with the preſent appearances of nature.

INSERTED COLUMN. See COLUMN.

INSERTION, a term frequently uſed, in *Anatomy*, to ſignify the implication of one part within another.

The inſertion of the bones, muſcles, and nerves in the members of an animal, is exceeding artful: the vena cava has its inſertion in the right ventricle of the heart.

INSERTION is alſo uſed, in *Agriculture*, for the incloſing a graft within the cleft of a tree. See GRAFTING.

INSESSUS, or INSESSIO, in *Medicine*, a kind of half-bath or ſemicupium, uſually prepared with a decoction of ſeveral herbs proper for the lower parts, wherein the patient ſits down to the navel.

It has ſeveral uſes; as the eaſing of pain, ſoftening the parts, diſpelling a flatulent matter, and frequently promoting the menſes.

INSHILLA, in *Geography*, a town of Africa, near the E. coaſt of Tunis; 108 miles S. of Tunis.

INSIDE GUARD, in *Fencing*, a guard with the broad-ſword, to ſecure the face and front of the body from a cut made at the inſide of the poſition, above the wriſt. See GUARD.

INSINUATION denotes a cunning, and covert way of creeping into any perſon's favour.

INSINUATION *of a will*, among *Civilians*, is the firſt production of it, or the leaving it with the regiſter, in order to its probate. See WILL.

INSIPID, TASTELESS, that which has nothing in it pungent enough to affect the palate, tongue, &c. and to occaſion that ſenſation we call *taſting*.

INSITION, INSITIO, in *Botany*, denotes the ſame with engrafting; *viz.* the act of inſerting and uniting a cion, bud, or the like, in the ſubſtance of the ſtock.

INSOKO, in *Geography*, a town of Africa, on the Gold Coaſt; 120 miles from the ſea.

INSOLATION, in *Medicine*, from *in* and *ſol*, the *ſun*, a term uſed by ſome writers to expreſs the diſeaſe, occaſioned by the direct action of the ſun's rays upon the human body, which has been called, in the Latin and French languages, *ictus ſolis*, and *coup de ſoleil*. See an account of this diſorder under the head HEAT, *in Medicine*.

INSOLATION, in *Pharmacy*, a method of preparing certain fruits, drugs, &c. by expoſing them to the heat of the ſun's rays; either to dry, to maturate, or to ſharpen them, as is done in vinegar, figs, &c.

The word comes from the Latin verb *inſolare*, which is uſed by Pliny and Columella; and ſignifies *to expoſe to the ſun*.

INSOLVENCY, *Act of*, in *Law*, an occaſional act, frequently paſſed by the legiſlature; whereby all perſons whatſoever, who are either in too low a way of dealing to become bankrupts, or not being in a mercantile ſtate of life are not included within the laws of bankruptcy, are diſcharged from all ſuits and impriſonment, upon delivering up all their eſtate and effects to their creditors upon oath, at the ſeſſions or aſſizes; in which caſe their perjury or fraud is uſually, as in caſe of bankrupts, puniſhed with death.

INSOLVENT, a term applied to ſuch perſons as have not wherewithal to pay their juſt debts.

A perſon dying, and not leaving eſtate ſufficient to diſcharge theſe, is ſaid to die inſolvent.

INSPECTING *Field-officer of a Diſtrict*, in *Military Language*, denotes an officer, ſelected from the line, and nominated by the War-office, to ſuperintend and to vouch for the faithful diſtribution of monies which are iſſued to officers acting on detachment, or on recruiting parties, within the limits of his ſtation.

All diſtrict pay-maſters are ſtrictly enjoined by the laſt general regulations to get their muſter-rolls and pay-liſts duly authenticated, not only before a juſtice of the peace, but to have them witneſſed by the inſpecting field officer. All the recruiting officers, &c. within the limits of the diſtrict are accountable and ſubordinate to the inſpecting field officer. It is the duty of the latter to be particularly minute in his examination of every thing which appertains to the recruiting ſervice. They have the command of all recruiting parties of regiments of cavalry and infantry in their diſtricts; they are authorized to give an intermediate approval of the recruits whom they judge fit for ſervice, except in caſes where regiments are ſo quartered, as to render it, in point of diſtance, equally convenient for the recruits to be ſent to their own head quarters. The ſenior officer in each quarter is ordered to report to the field officer of the diſtrict. No officer is to leave his ſtation even for one day, without reporting to the field officer who has the command of the recruiting parties in the diſtrict, or to be abſent from it for more than one day, without the previous permiſſion of the field officer. The field officers in their diſtricts, are to be reſponſible for the dreſs, regularity, and good conduct of the officers, non-commiſſioned officers and pivate men of the ſeveral recruiting parties under their command. They are conſtantly to wear their uniforms, whilſt in their diſtricts, and they are to ſee, that his majeſty's orders reſpecting the due obſervance of diſcipline, regularity, and uniformity of appearance among the officers, non-commiſſioned officers and privates, be ſtrictly and unequivocally adhered to.

Field officers of diſtricts may order detachment courts martial, to be compoſed of the recruiting officers in their diſtricts, in the uſual number and ranks, and they are to approve of every ſuch court martial, and to direct the puniſhment awarded thereby to be executed, mitigated or remitted, as they ſhall think expedient. They are to receive orders from the inſpector-general of the recruiting ſervice, reſpecting the nature of their returns; and all returns and reports are to come to the inſpector-general through them. Each diſtrict field officer has an allowance of ten ſhillings a day, in addition to the full pay of his reſpective regimental rank, and he is to be reimburſed for the actual expence he incurs for ſtationary and poſtage of letters; which charge muſt be accompanied by a certificate upon honour.

Each diſtrict field officer is allowed to appoint a ſubaltern officer (not employed upon the recruiting ſervice) to act as adjutant in the diſtrict. The pay or allowance of ſuch ſubaltern is three ſhillings a day in addition to his full regimental pay; he is alſo authorized to nominate two ſerjeants, with the additional pay of ſixpence each, one to act as ſerjeant major, and the other as clerk to the diſtrict.

Each field officer may moreover give directions to the hoſpital mate, who is placed under his orders, to examine the recruits when brought for inſpection, and to give ſuch medical aſſiſtance as may be in his power, to the ſeveral recruiting parties in the diſtrict he belongs to.

When colonels of regiments take upon themſelves the whole direction of the recruiting ſervice for their own corps, they muſt conform to the regulations which require returns to be made to the inſpector-general of the recruiting ſervice; and they muſt inſtruct their officers to ſend weekly returns to the regulating field officer, in whoſe diſtrict they are ſtationed, of all the caſualties that have occurred. See pages 105, 106, 107, and 108 of the General Regulations.

INSPECTION denotes examination, ſurvey, and ſuperintendance of *general*, *regimental*, and *company* duties. A *general* inſpection is made annually by the reviewing generals of diſtricts. Every regiment, on this occaſion, is minutely looked into, and a faithful account muſt be delivered by each commanding officer of the actual ſtate of his regiment, together with all the caſualties that have occurred during the current year. The inferior economy of the corps is not only inveſtigated to the bottom, but the diſcipline of the men is likewiſe examined. For a more particular explanation of the latter, ſee Review.

Inspection, *Regimental*, is made once a month by the commanding officer. The clothing, the neceſſaries, arms, and accoutrements belonging to the different companies are examined by the lieutenant-colonel or major of the corps. Specific returns are made by the officers commanding troops or companies, by whom the debts and credits of the men, which have been made up and accounted for on the 24th day in each month, in infantry regiments, and on the 24th day in each ſecond month in cavalry corps, are exhibited for examination at head quarters. This forms the ground-work or baſis of the general inſpection, at which the troop or company book ſhould always be produced.

Inspection, *Private, of Companies*, is the firſt ſtep towards the other two, and ought to be made every Monday morning, by each officer commanding a troop or company, or by his ſubaltern.

Inspection *of Neceſſaries* is an examination of the different articles which every ſoldier is directed to have in good repair. The regular or eſtabliſhed proportion of neceſſaries that each ſoldier of cavalry and infantry is to be in poſſeſſion of on the 24th day of each month, to entitle him to receive the balance that may be then due to him, conſiſts of the following articles.

Cavalry.—3 ſhirts, 2 pair of ſhoes, 3 pair of ſtockings, 1 pair of gaiters, 1 forage cap, 1 ſaddle-bag, 1 pair of canvas, or woollen over-hoſe, 1 canvas, or woollen frock or jacket, 1 ſtock, 1 black-ball, 2 bruſhes, 1 curry-comb and bruſh, 1 mane comb and ſpunge, and 1 horſe-picker.

Infantry.—3 ſhirts, 2 pair of ſhoes, 2 pair of ſtockings, or 2 pair of ſocks, 1 pair of long gaiters, 1 forage cap, 1 pack, 1 ſtock, 1 black-ball, and 2 bruſhes.

Inspection, or *Examination, Trial by.* See Examination.

INSPECTOR-*General of Cavalry*, a general officer, whoſe particular duty is to inſpect all cavalry regiments, to report the ſtate of the horſes, and to receive ſpecific accounts from the different corps of their actual ſtate; he communicates with the commander-in-chief, and whenever a cavalry regiment is ordered to be diſbanded, it muſt be looked at by the inſpector-general before it is finally broken.

Inspector-*General of the Recruiting Service*, an officer of rank, through whom the field officers of diſtricts, and colonels of regiments (when they perſonally manage the recruiting ſervice of their own corps) tranſmit their ſeveral returns to the adjutant-general's office. All recruiting parties which are ſent to the great manufacturing towns in England and Wales, as alſo to Scotland and Ireland, muſt be previouſly authorized ſo to do by the inſpector-general.

Two field officers have been lately appointed as permanent inſpectors of *clothing*. Theſe inſpectors, or the inſpectors for the time being, are directed to view and compare with the ſealed patterns, the clothing of the ſeveral regiments of cavalry and infantry, as ſoon as the ſame ſhall have been prepared by the reſpective clothiers; and if the ſaid clothing appear to be conformable to the ſealed patterns, they are authorized to grant two certificates of their view and approval thereof; one of which certificates is to be delivered to the clothier, to be ſent with the clothing to the head quarters of the corps, and the other to be lodged with the general clothing board, as the neceſſary voucher for paſſing the aſſignment of the allowance for the ſaid clothing.

All clothing muſt be viewed, and certificates be ſigned by *both* inſpectors, except in caſes where the abſence of one of them ſhall be unavoidable; in all which caſes the cauſe of ſuch abſence is to be ſtated by the other inſpector, in his certificate of the view of the clothing.

Inſpectors of clothing are to follow all inſtructions which may be tranſmitted to them from the commander-in-chief, the ſecretary at war, or the clothing board.

Inspector *of Hoſpitals*, the next on the ſtaff to the ſurgeon general.

Inspector, a perſon to whom the care and conduct of any work is committed.

Inspectors, in the *Roman Law*, were ſuch perſons as examined the quality and value of lands and effects, in order to the adjuſting or proportioning taxes and impoſitions to every man's eſtate.

The Jews alſo have an officer, in their ſynagogue, whom they call *inſpector*, חזן, *hhazen*. His buſineſs conſiſts principally in inſpecting, or overlooking the prayers and leſſons, in preparing and ſhewing them to the reader, and in ſtanding by him to ſee he reads right; and, if he makes miſtakes, he is to correct him.

INSPICIENDO Ventre. See Ventre.

INSPIRATION, in *Phyſiology*, the act of drawing the atmoſpheric air into the lungs. See Lung.

Inspiration, among *Divines*, &c. implies the conveying of certain extraordinary and ſupernatural notices, or motions, into the ſoul: or, it denotes any ſupernatural influence of God upon the mind of a rational creature, whereby he is formed to any degree of intellectual improvements, to which he could not, or would not, in fact, have attained in his preſent circumſtances, in a natural way.

If a man were inſtantaneouſly enabled to ſpeak a language which he had never learned, how poſſible ſoever it might have been for him to have obtained an equal readineſs in it by degrees, few would ſcruple to ſay, that he owed his acquaintance with it to divine inſpiration. Or, if he gave a true and exact account of what was doing at a diſtance, if he publiſhed a particular relation of what he neither ſaw nor heard, as ſome of the prophets did, all the world would own (if the affair were too complex, and the account too circumſtantial to be the reſult of a lucky gueſs), that he muſt be inſpired with the knowledge of it; though another account, equally exact, given by a perſon on the ſpot, would be aſcribed to no inſpiration at all.

Thus the prophets are ſaid to have ſpoken by divine inſpiration.

Some authors reduce the inſpiration of the ſacred writers to a particular care of Providence, which prevented any thing they had ſaid from failing, or coming to nought; maintaining, that they never were really inſpired, either with knowledge, or expreſſion.

According to M. Simon, inſpiration is no more than a direction of the Holy Spirit, which never permitted the ſacred writers to be miſtaken.

It is a common opinion, that the inſpiration of the Holy Spirit regards only the matter, not the ſtyle, or words; and this ſeems to fall in with M. Simon's doctrine of direction.

Theological writers have enumerated ſeveral kinds of inſpiration: ſuch as an inſpiration of *ſuperintendency*, in which God does ſo influence and direct the mind of any perſon, as to keep him more ſecure from error in ſome various and complex diſcourſe, than he would have been merely by the uſe of his natural faculties; *plenary ſuperintendent* inſpiration, which excludes any mixture of error at all from the performance ſo ſuperintended; inſpiration *of elevation*, where the faculties act in a regular, and, as it ſeems, in a common manner, yet are raiſed to an extraordinary degree, ſo that the compoſer ſhall, upon the whole, have more of the true ſublime, or pathetic, than natural genius could have given; and inſpiration *of ſuggeſtion* when the uſe of the faculties is ſuperſeded, and God does, as it were, ſpeak directly to the mind, making ſuch diſcoveries to it as it could not otherwiſe have obtained, and dictating the very words in which ſuch diſcoveries are to be communicated, if they are deſigned as a meſſage to others. It is generally allowed that the New Teſtament was written by a ſuperintendent inſpiration: for without this the diſcourſes and doctrines of Chriſt could not have been faithfully recorded by the evangeliſts and apoſtles; nor could they have aſſumed the authority of ſpeaking the words of Chriſt, and evinced this authority by the actual exerciſe of miraculous powers: and beſides, the ſacred writings bear many obvious internal marks of their divine original, in the excellence of their doctrines, the ſpirituality and elevation of their deſign, the majeſty and ſimplicity of their ſtyle, the agreement of their various parts, and their efficacy on mankind; to which may be added, that there has been in the Chriſtian church, from its earlieſt ages, a conſtant tradition, that the ſacred books were written by the extraordinary aſſiſtance of the ſpirit, which muſt at leaſt amount to ſuperintendent inſpiration. But it has been controverted whether this inſpiration extended to every minute circumſtance in their writings, ſo as to be in the moſt abſolute ſenſe plenary. Jerom, Grotius, Eraſmus, Epiſcopius, and many others, maintain that it was not; whilſt others contend, that the emphatical manner in which our Lord ſpeaks of the agency of the ſpirit upon them, and in which they themſelves ſpeak of their own writings, will juſtify our believing that their inſpiration was plenary, unleſs there be very convincing evidence brought on the other ſide to prove that it was not: and if we allow, it is ſaid, that there were ſome errors in the New Teſtament, as it came from the hands of the apoſtles, there may be great danger of ſubverting the main purpoſe and deſign of it; ſince there will be endleſs room to debate the importance both of facts and doctrines.

What has been above denominated *ſuperintendent* inſpiration in the language of Dr. Doddridge, Mr. Whitby expreſſes by inſpiration of *direction*: and he thus diſtinguiſhes it from the inſpiration by *ſuggeſtion*. 1. Where there is no antecedent idea or knowledge of the things written for the good of others, to be obtained from reaſon or a former revelation, an inſpiration of ſuggeſtion muſt be vouchſafed to the apoſtles, in order to enable them to make ſuch things known to the world. But where there is ſuch an antecedent knowledge of the things to be indited, it can only be neceſſary that God ſhould immediately, or by ſome ſpecial occaſions, excite them to indite thoſe things, and ſhould ſo carefully preſide over and direct their minds, whilſt writing, as to ſuggeſt or to bring into their memories ſuch things as his wiſdom thought fit to be written, and ſhould not ſuffer them to err in the delivery of what was thus written in his name, or as apoſtles of God the Father and our Lord Jeſus Chriſt. 2. In all their revelations of myſteries, or things which could not otherwiſe be made known to them, either by natural reaſon or antecedent revelation, they muſt be acknowledged to have had them by an immediate ſuggeſtion of the holy ſpirit. 3. As for thoſe things which they did know already, either by natural reaſon, education, or antecedent revelation, they needed only ſuch an aſſiſtance or direction in them, as would ſecure them from error in their reaſonings, or in the confirmation of their doctrines by paſſages contained in the Old Teſtament; and therefore a continual ſuggeſtion muſt be neceſſary in this caſe. 4. In writing the hiſtorical parts of the Old Teſtament, or matters of fact relating to themſelves and others, it is only neceſſary, that what is there delivered as matter of fact ſhould be truly performed, as it is ſaid to have been done; but it is not neceſſary that they ſhould be related in that order of time in which they were performed, unleſs alſo that be affirmed of them: for this muſt be ſufficient to aſſure us of the truth of what they thus delivered. Moreover, in writing the diſcourſes contained in theſe books, it is not neceſſary that the very words ſhould be ſuggeſted or recorded, in which they were firſt ſpoken, but only that the true intent and meaning of them ſhould be related, though in diverſity of words; though the promiſe made to the apoſtles by our Lord, that the holy ſpirit ſhould bring to their remembrance all things which he had ſaid unto them, doth fairly plead for this exactneſs in what they have delivered of our Saviour's ſermons; it being ſcarcely imaginable their memory, without divine aſſiſtance, ſhould exactly give us all that was ſpoken in ſuch long diſcourſes. Laſtly, it appears, ſays Dr. Whitby, that I contend only for ſuch an inſpiration, or divine aſſiſtance, of the ſacred writers of the New Teſtament, as will aſſure us of the truth of what they write, either by inſpiration of *ſuggeſtion* or *direction* only, but not for ſuch an inſpiration as implies, that even their words were dictated, or their phraſes ſuggeſted to them by the Holy Ghoſt. Dr. Whitby cannot allow, 1. For any ſlips of memory in the compilers of the ſacred books of the New Teſtament; for though theſe are allowed by ſome in matters of ſmall conſequence, as they are pleaſed to ſtyle them, yet it is of great conſequence that we do not own them: for, if you grant they have ſlipped at all, by what rules can we affirm that they have not ſlipped above an 100 times, or even in moſt of their hiſtorical relations? 2. He cannot grant, that the apoſtles determined any matters of practice merely from rules of human prudence, without the guidance and direction of the holy ſpirit. 3. Dr. Whitby does not allow that St. Paul doth not always uſe the beſt arguments, but ſuch as are beſt ſuited to the capacities and notions of thoſe to whom he writes: if ſo, by what rules ſhall we be able to diſtinguiſh betwixt his arguments, on which we may ſafely rely, as being abſolutely true, and thoſe which are only accommodated to the notions of thoſe with whom he had to do?

Dr. Whitby next proceeds to lay down the arguments which prove, that the apoſtles were aſſiſted and preſerved from error by the ſpirit of God, and were enabled to deliver to us an unerring rule of faith. Theſe arguments are the following: 1. Their aſſertions concerning their own writings, and what they ſay reſpecting the declarations made, the doctrines delivered, and the directions given in them. 2. The things which God ſpake to his ſervants the prophets are ſtyled the things which I command by my ſpirit. (Zech. i. 6.) But the apoſtles were thus aſſiſted. Peter ſays they preached the goſpel by the Holy Ghoſt ſent down from heaven; they ſpake as they were moved by the Holy Ghoſt; they ſtyle themſelves prophets and apoſtles: they challenge a like illumination with the ancient prophets: they pretend to teach others in words taught them by the Holy Ghoſt. In all theſe ſayings they muſt have been guilty of a falſe teſtimony concerning God, and muſt impoſe upon the church of Chriſt, if no ſuch aſſiſtance of the holy ſpirit was imparted to them. 3. The infallible aſſiſtance granted to the apoſtles is inferred from our Saviour's promiſe to them, repeated on different occaſions. 4. The ſacred records were to be a ſtanding rule of faith through all ages; and therefore in all things propounded in them to our faith, they muſt contain a divine teſtimony, or a revelation of the will of God. 5. That the apoſtles and writers of the New Teſtament were aſſiſted both in their preaching and writing by the ſpirit of God, is atteſted by Chriſtians of all ages from the beginning.

Dr. Benſon, in his "Diſſertation on Inſpiration," publiſhed in his "Commentary on the Epiſtles," and included in biſhop Watſon's "Collection of Tracts," obſerves, that many of the difficulties and objections that have been raiſed concerning inſpiration have been very much owing to the miſtaken accounts given by ſome of the friends to revelation. What he takes to be the genuine account, appears, at firſt view, eaſy and natural, and alſo, upon examination, the moſt unexceptionable. It is this: as Moſes retained in his mind the perfect and entire idea of the pattern ſhewn him in the mount, according to which model he was to make all things; ſo the apoſtles, and they alone, had in their minds the full and complete ſcheme of whatever they were to preach or write concerning the Chriſtian doctrine. And according to that model they were to found and erect the Chriſtian church. Not that they had the whole ſcheme of the Chriſtian revelation in its utmoſt extent fully communicated to them at once, the contrary of this is evident; for on the day of pentecoſt, the twelve apoſtles of the circumciſion do not appear to have received any more than the revelation of that goſpel, which they were to preach to Jews only. It was ſome years after that they had the particular revelation concerning their going to the devout Gentiles, and concerning the goſpel which they were to preach to them: and it was a long time before the particular revelation was communicated to the apoſtles of the uncircumciſion, concerning their going among the idolatrous Gentiles, or what goſpel they were to preach to them. And finally, different apoſtles of both claſſes had, beſides the general ſcheme, different revelations communicated to them. What is meant is this, that they had by immediate revelation the whole ſcheme of what they were to preach to the Jews, before they addreſſed themſelves to the Jews; and the whole ſcheme of what they were to preach to the devout or idolatrous Gentiles, before they addreſſed themſelves to devout or idolatrous Gentiles; and that they retained in their minds conſtantly the complete idea of the whole ſcheme, after it was communicated to them. From this conſtant fund of knowledge, they were enabled clearly to determine (as far as any caſe required) what was, or was not, the Chriſtian doctrine. This revelation of the whole ſcheme of the religion of Jeſus is, as Dr. Benſon apprehends, what St. Paul underſtood by the word of wiſdom, which ſtands firſt in the order of ſpiritual gifts; 1 Cor. xii. 18. Though the evangeliſts and prophets had ſome of the inferior gifts of the ſpirit, yet it was what they had received from the apoſtles, that they were to teach and to commit to faithful men, who were to teach others. The Old Teſtament prophets were not under a conſtant divine inſpiration, unleſs we except Moſes during the time in which he was erecting all things, according to the pattern ſhewn him in the mount: but the apoſtles had this fund of illumination conſtantly reſiding within them, from the time of its being communicated to the end of their lives. Chriſtian prophets, being of an order inferior to the apoſtles, were neither under conſtant inſpiration, nor had they at any time any more than particular revelations, relating to particular caſes. Dr. Benſon ſuppoſes, that the books of the New Teſtament derive their infallibility from their being written, taught, reviewed, or approved of by ſome of the apoſtles, who alone had this fund of knowledge conſtantly reſiding in them. Whenever, therefore, they ſpoke or wrote concerning Chriſtianity, this fund of revelation kept them right. But they were reaſonable creatures as well as inſpired apoſtles, and therefore could ſpeak or write about common affairs, as men that have the uſe of their reaſon, without any inſpiration, can eaſily do; inſtances of which frequently occur. Upon this ſyſtem, ſuch things only are aſcribed to inſpiration, as (all circumſtances conſidered) required inſpiration; and ſuch things to human reaſon, as human reaſon alone was capable of.

It appears by citations from the writings of the primitive fathers, Clemens Romanus, Polycarp, Juſtin Martyr, Clemens Alexandrinus, Origen, Tertullian, &c., that moſt of them maintained the plenary ſuperintendent inſpiration of the ſacred writers, and particularly of the apoſtles. This kind of inſpiration ſome have conceived neceſſary to vindicate the credibility of the doctrines and the authority of the precepts which they delivered under a divine commiſſion. Others, however, have objected to this plenary inſpiration; and allege miſtakes and contradictions which occur in the hiſtory of their conduct and in their writings, ſee Matt. x. 19, 20; Mark, xiii. 11; compared with Acts, xxiii. 1–6. It has been ſaid that the apoſtles did not ſeem to apprehend each other to be inſpired, as appears by their debating with each other in the council at Jeruſalem (Acts, xv.), and by Paul's blaming Peter (Gal. ii. 24.); and it is farther urged, that the Chriſtians in thoſe early days did not apprehend them to be infallible, ſince their conduct was in ſome inſtances queſtioned and arraigned. (Acts, xi 2, 3. xxi. 20—24.) It has been alſo ſaid, that Paul, who aſſerts himſelf to have been inferior to none of the reſt of the apoſtles (2 Cor. xi. 5. xii. 11.) ſpeaks of himſelf in ſuch a manner, as plainly to ſhew that he did not apprehend himſelf under ſuch a plenary inſpiration (1 Cor. vii. 10. 12. 25. 40. 2 Cor. xi. 17.); nor do we find that any of the apoſtles introduce their diſcourſes with ſuch clauſes as the prophets uſed, to declare that they ſpoke as the oracles of God. To this objection, however, it has been replied, that their diſtinguiſhing in the caſes here referred to ſeems ſtrongly to imply, that their deciſions in *other* points of doctrine and duty were by "immediate revelation from Chriſt." It has been alſo pleaded, againſt the plenary inſpiration above ſtated, that it is inconſiſtent with that diverſity of diction or ſtyle which occurs among the ſacred penmen. Is not the ſtyle, it is ſaid, of all inſpired writers the ſame, as being the ſtyle of the ſame ſpirit by which they were alike directed? It is argued on the other hand, that in ſome ſenſe the ſtyle of all thoſe writers is the ſtyle of the holy ſpirit, who ſpoke by them, and was the ſame in them all; but that the holy ſpirit ſhould always employ the ſame ſtyle in conveying celeſtial truths to men, is no more neceſſary than that he ſhould always uſe the ſame language. We have no reaſon to doubt that the ſacred writers were permitted to employ the ſtyle and idiom moſt familiar to them, in delivering the truths with which they were inſpired. So far only were they over-ruled in point of expreſſion, by the divine ſpirit, that nothing could be introduced tending in any way to obſtruct the intention of the whole. And ſometimes, eſpecially in the prediction of future events, ſuch terms would be ſuggeſted as would, even beyond the prophet's apprehenſion, conduce to further that end. But this doctrine, it may be ſaid, is liable to an objection from the gift of tongues conferred on the apoſtles and others for the promulgation of the goſpel. In the languages with which thoſe primitive miniſters were miraculouſly furniſhed, it may be objected they could have no ſtyle of their own, as a ſtyle is purely the effect of habit, and of inſenſible imitation. This objection, however, is eaſily obviated: 1ſt, as they received by inſpiration thoſe tongues only of which they had previouſly no knowledge, it is not probable, at leaſt it is not certain, that this gift had any place in the writings of the New

Teſtament; that in moſt of them it had not is manifeſt. But, 2dly, if in ſome it had, the moſt natural ſuppoſition is, firſt, that the knowledge of the tongue with which the Holy Ghoſt inſpired the ſacred writers, muſt have been in them preciſely ſuch a knowledge, and ſuch a readineſs in finding words and expreſſions, as is in others the effect of daily practice. This is even a neceſſary conſequence of ſuppoſing that the language itſelf, and not the words of particular ſpeeches (according to the notion of Dr. Middleton, in his "Eſſay on the Gift of Tongues") was the gift of the ſpirit: And, 3dly, that their acquaintance with the tongues, ſupernaturally communicated, muſt have been ſuch as would render their teaching in it beſt adapted to the apprehenſions of the people with whom they would be moſt converſant, or ſuch as they would moſt readily have acquired in the natural way. Now on this hypotheſis, which on many accounts appears the moſt rational, the influence of habit, of native idiom, and of particular genius and turn of thinking, would be the ſame on the writer's ſtyle as though he had acquired the language in the ordinary way. Becauſe Cicero and the Greek philoſophers were of opinion, that if Jupiter ſpoke Greek, Dr. Middleton cannot conceive, that a ſtyle ſo unlike Plato's as that of the evangeliſts, can be the language of inſpiration, or be accounted worthy of God. But it was not, we know, peculiar to the Greeks or to the apoſtolic age to ſet too high a value on the words which man's wiſdom teacheth. See more on this ſubject in Campbell's Preliminary Diſſertations, Diſſ. 1.

It has been obſerved, in reference to the ſubject of inſpiration, that our Lord's evangeliſts report our Lord's diſcourſes with very great variations in their particular expreſſions; and hence ſome authors have been led to give up the opinion of the inſpiration of the evangeliſts, as writers. Thus they ſay, they are able to place the goſpel hiſtory on the ſame unexceptionable footing with other credible hiſtories, reſting on independent teſtimonies, in conſequence of their agreeing in all matters of importance, and appearing to be independent of each other, by their diſagreement in matters of no importance. By this means they alſo diſencumber the evidence of the goſpel hiſtory of many objections inſignificant indeed in themſelves, but rendered of the greateſt magnitude, and even abſolutely inſuperable by thoſe who profeſs to maintain the plenary inſpiration of the ſcriptures. Dr. Prieſtley is one of thoſe writers who has adopted this hypotheſis. He ſays, however, he is far from denying all inſpiration; but only the univerſal and infallible inſpiration of the ſcripture hiſtorians as "writers." When the prophets or apoſtles worked miracles, or delivered prophecies, and other meſſages from God, they muſt have been inſpired. Paul alſo ſeems to ſay, that he received his knowledge of the goſpel by a perſonal communication from Chriſt after his reſurrection. (Prieſtley's Preface to his Harmony.) After all, it ſhould be remembered that our Lord made an expreſs promiſe to his apoſtles, that "the ſpirit of truth ſhould lead them into all truth, and bring all things to their remembrance whatever he ſaid unto them," John, xiv. 26; and this promiſe ſeems to warrant that notion of inſpiration which we have ſtated towards the beginning of this article.

Michaelis, (Introduction to the New Teſtament) after weighing, with all that care and attention which ſo important a ſubject requires, the arguments which may be advanced on both ſides, thinks it adviſable to divide the queſtion. To the epiſtles, inſpiration is of real conſequence; but with reſpect to the hiſtorical books, *viz.* the Goſpels and the Acts of the Apoſtles, we ſhould really be no loſers if we abandoned the ſyſtem of inſpiration, and in ſome reſpects have a real advantage. We ſhould be no loſers if we conſidered the apoſtles, in hiſtorical facts, as merely human witneſſes, as Chriſt himſelf has done in ſaying, "Ye alſo ſhall bear witneſs, becauſe ye have been with me from the beginning." (John, xv. 27.) And no one that attempts to convince an unbeliever of the truth of Chriſtianity, would begin his demonſtration by pre-ſuppoſing a doctrine which his adverſary denies, but would ground his arguments on the credibility of the evangeliſts as human hiſtorians for the truth of the miracles, the death and the reſurrection of Chriſt. Even thoſe who examine the grounds of their faith for their own conviction, muſt treat the evangeliſts as human evidence, ſince it would be arguing in a circle to conclude that the facts recorded in the goſpels are true, becauſe they are inſpired, when we conclude the ſcriptures to be inſpired in conſequence of their contents. In theſe caſes, then, we are obliged to conſider the evangeliſts as human evidence, and it would be no detriment to the Chriſtian cauſe to conſider them at all times as ſuch in matters of hiſtorical fact. We find it no where expreſsly recorded that the public tranſactions which the apoſtles knew by their own experience, and of which St. Luke informed himſelf by diligent inquiry, ſhould be particular objects of divine inſpiration. We ſhould even be conſiderable gainers, in adjuſting the harmony of the goſpels, if we were permitted to ſuppoſe that ſome one of the evangeliſts had committed an immaterial error, and that St. John has rectified ſome trifling miſtakes in the preceding goſpels. The moſt dangerous objections that can be made to the truth of our religion, and ſuch as are moſt difficult to anſwer, are thoſe drawn from the different relations of the four evangeliſts. Mr. Kiddle, in the beginning of the ſecond ſection of his "Eſſay on Inſpiration," entertains ſentiments ſimilar to thoſe of Michaelis; now, if we advert to the ſentiments of Grotius, already recited, and which gave riſe to the famous theological diſputes between the Dominicans and the Jeſuits, will the diſtinction between the inſpiration of the hiſtorical books, and that of the epiſtles, appear to be new? As to the writings of thoſe that were apoſtles, Michaelis maintains that their inſpiration depends on their authenticity. If they are written by the apoſtles, to whom they are aſcribed, we conſider them as divinely inſpired: if not written by apoſtles, they can make no pretenſion to inſpiration. But it may be aſked, on what argument the poſition is grounded, that the writings of the apoſtles, if genuine, are inſpired? It is anſwered, on the teſtimony of Chriſt and his apoſtles, which is credible and ſacred, becauſe they have confirmed their doctrines by numberleſs miracles. But, where is this evidence recorded? It is certain, in the firſt place, that the apoſtles muſt be regarded not only as prophets, but as greater than prophets. (Mark, xi. 9—11.) Again, if we conſider Chriſt's more immediate promiſes of inſpiration to the apoſtles, we ſhall find that he has given them, in the moſt proper ſenſe of the word, at three ſeveral periods: 1ſt, when he ſent the apoſtles to preach the goſpel (Matt. x. 19, 20); 2dly, in holding a public diſcourſe relating to the goſpel, at which was preſent a conſiderable multitude (Luke, xii. 11, 12.); 3dly, in his prophecy of the deſtruction of Jeruſalem. (Mark, xiii. 2. Luke, xxi. 14, 15.) It is true, that when we argue from their inſpiration on theſe occaſions to the inſpiration of their writings, we draw a concluſion "a minore ad majus," but it is a concluſion to which no rational objection can be made; for if they were to expect inſpiration for thoſe ſpeeches and anſwers, which were only temporary, and in which they appeared rather as advocates than teachers, how much more reaſon had they to expect inſpiration in thoſe writings which were to ſerve as a ſtandard of faith to poſterity? Michaelis conceives, that Chriſt alluded to the future writings of the apoſtles, when he ſaid to Peter, "Thou art Peter" (*i. e.* a rock), &c. Another promiſe, firſt given to Peter, and afterwards extended to all the apoſtles, occurs in Matth. xvi. 19. xviii. 18. If the authority here referred to was given to the apoſtles without reſerve, it is manifeſt, that, as often as they appeared as teachers of the goſpel, they were attended by a conſtant inſpiration, and of courſe when they committed the precepts of Chriſtianity to writing; or elſe, we muſt have recourſe to the hypotheſis, that the Deity permitted errors to intrude themſelves into the morality of the goſpels: this is highly improbable; but whichſoever hypotheſis we adopt, we ſhall come to this concluſion, that the moral precepts, which are contained in the writings of the apoſtles, are for us commands of the Deity. Moreover, the promiſes which were given by Chriſt in the night preceding his death, of the continual aſſiſtance of the Holy Ghoſt, deſerve particular attention; more eſpecially as they are recorded in the goſpel of St. John (ch. xiv. 16, 17. xv. 26, 27. xvi. 7—11.), who wrote with a particular view to ſupport the authority of the apoſtles againſt the Gnoſtics. Beſides, the apoſtles aſſert their own inſpiration. Thus St. Paul does, Gal. i. 11, 12. 1 Cor. xi. 23. 1 Cor. ii. 13. xiv. 37, 38; and 1 Pet. i. 12. As to thoſe books of the New Teſtament, which were written by the aſſiſtants of the apoſtles, *viz.* the goſpels of St. Mark and of St. Luke, and the Acts of the Apoſtles, Michaelis heſitates in admitting their inſpiration. See Mark and Luke.

Among the heathens, the prieſts and prieſteſſes were ſaid to be divinely inſpired, when they gave oracles.

The poets alſo laid claim to it; and to this end they always invoked Apollo and the muſes at the beginning of any great work.

INSPISSATING, in *Pharmacy*, an operation whereby a liquor is brought to a thicker conſiſtence, by evaporating the thinner parts.

Thus, juices, as that of liquorice, are inſpiſſated.

INSPRUCK, in *Geography*, a town of Germany, and capital of the Tyroleſe, ſituated on the Inn. The ſuburbs without the walls are large, and occupied by palaces, churches, and convents. This town is the reſidence of the ſupreme repreſentative and aulic chamber, of the reviſion-judicatory of the counties of the Lower and Upper Auſtria, and alſo of the regency or lords-juſtices. In the middle of the Franciſcan church is a magnificent monument, on the top of which is a metal ſtatue of Maximilian I. in a kneeling poſture, ſurrounded by four others repreſenting the Virtues; and in white marble are exhibited the exploits of that emperor. There are ſome other coſtly curioſities in this place. The gymnaſium of the Jeſuits was converted by the emperor Leopold into an univerſity in 1672, calling it "Cæſareo-Leopoldina;" and in 1745 Maria Thereſa preſented to it the collection of books, formerly kept at the citadel of Ambras, together with other books out of the imperial library at Vienna. This town was taken by the French in 1805: 28 miles N. of Brixen. N. lat. 47° 16′. E. long. 11° 30′.

INSTALLMENT, a ſettling or inſtating a perſon in a dignity, as that of a chancellor in one of our univerſities, &c.

The word is derived from the Latin *in*, and *ſtallum*, a term uſed for a ſeat in the church, in the choir, or a ſeat or bench in a court of juſtice, &c. though Voſſius is of opinion the word is of German origin.

Inſtallment is chiefly uſed for the induction of a dean, prebendary, or other eccleſiaſtical dignitary, into the poſſeſſion of his ſtall, or proper ſeat, in the cathedral church to which he belongs.

This is ſometimes alſo called *inſtallation*.

Inſtallment is likewiſe uſed for the ceremony, whereby the knights of the Garter are placed in their rank, in the chapel of St. George, at Windſor; and on many other like occaſions.

INSTANT, ſuch a part of duration, wherein we perceive no ſucceſſion; or it is that which takes up the time of only one idea in our minds.

The ſchoolmen diſtinguiſh three kinds of inſtants; a *temporary*, a *natural*, and a *rational* inſtant.

Instant, *Temporary*, is a part of time immediately preceding another: thus, the laſt inſtant of a day precedes immediately and really the firſt inſtant of the following day.

Instant, *Natural*, is what we otherwiſe call a *priority of nature*, which obtains in things that are ſubordinated in acting: as, firſt and ſecond cauſes; or cauſes and their effects: for the nature of things requires, that if there be a ſecond cauſe, there muſt be a firſt; and that there muſt be a cauſe, if there be an effect.

Instant, *Rational*, is not any real inſtant, but a point which the underſtanding conceives to have been before ſome other inſtant, founded on the nature of the things which occaſions it to be conceived. For inſtance, as God has made ſeveral things voluntarily, which he could otherwiſe have let alone; there is a reaſonable foundation to conceive God, ſuch as he is in himſelf, before he had made any of thoſe voluntary determinations: but as there was no real inſtant when God had not formed any determination, this inſtant is called a *rational* inſtant, by way of oppoſition to an inſtant of time.

INSTANTANEOUS Action. See Action.

INSTANTER, *Trial*, in *Law*. See Reprieve.

INSTAURATION, the re-eſtabliſhment, or reſtauration, of a religion, a church, or the like, to its former ſtate.

The word is by ſome derived from the old Latin *inſtaurum*, which ſignified the ſtock of things neceſſary for the tilling and managing of grounds; as cattle, tools, harneſs, &c. The word inſtaurum is only of the middle age; but inſtauratio is of much greater antiquity, and by ſome is derived from *inſtar*, *like;* as importing a thing's being brought to its former likeneſs or appearance.

INSTEP, in the *Manege*, is that part of the hinder leg of a horſe that correſponds to the ſhank in the fore-leg, extending from the ham to the paſtern joint.

INSTERBURG, in *Geography*, a town of Pruſſian Lithuania, containing two churches, about 350 houſes, and 3000 inhabitants. The principal articles of its trade are corn and beer; 44 miles E. of Konigſberg. N. lat. 54° 35′. E. long. 22° 21′.

INSTINCT, a natural diſpoſition, or ſagacity, wherewith animals are endued; and by virtue whereof they are enabled to provide for themſelves, and know what is good for them, and are determined to preſerve and propagate their ſpecies.

The term *inſtinct*, however, has been variouſly explained and defined. Inſtinct, according to Dr. Reid, is a natural blind impulſe to certain actions, without having any end in view, without deliberation, and very often without any conception of what we do; and he conſiders inſtinct as one ſpecies of the mechanical principles of action, the other being habits. An ingenious writer, of whoſe obſervations we avail ourſelves in the compilation of this article, defines inſtinct to be a tendency implanted in the minds of animals, when under the influence of certain feelings or ſenſations, to perform ſpontaneouſly, unerringly, independently of all teaching and experience, and without any determinate view to conſequences, certain actions neceſſary for the preſervation of the individual and the continuation of the kind.

Inſtinct in brutes bears ſome analogy to reaſon in men. There have been many ſyſtems adopted to explain the principles which produce and direct the ſpontaneous actions of brute animals.

Many of the ancient philoſophers aſcribed to brutes an underſtanding differing only in degree from that of man, and attributed their inferiority to the want of proper and ſufficient bodily organs. This ſyſtem has been very ſtrenuouſly ſupported by M. Helvetius, de l'Eſprit, tom. i. p. 2. &c. Among the moderns the learned Cudworth endeavoured to explain the inſtinct of animals, by means of a certain plaſtic nature. Des Cartes thought that all the actions of brute animals might be explained by the ſimple laws of mechaniſm, and conſiders them as machines totally devoid of life and ſentiment, but ſo curiouſly conſtructed by the Creator, that the mere impreſſions of light, ſound, and other external agents, on their organs, produced a ſeries of motions in them, and cauſed them to execute thoſe various operations, which had before been aſcribed to an internal principle of life and ſpontaneity. But the actions and manners of animals, which are totally incompatible with the mere principles and laws of mechaniſm, evince the abſurdity of this opinion. The dogma of Des Cartes is ſaid to have been firſt introduced by Pherecydes, the maſter of Pythagoras; and though Des Cartes had the merit of developing and applying this hypotheſis, the doctrine was before publiſhed by the Spaniard Pereira. M. Buffon adopts the opinion of Des Cartes in part, but grants brute animals life, and the faculty of diſtinguiſhing between pleaſure and pain, together with a ſtrong inclination to the former and averſion from the latter. By theſe inclinations and averſions he undertakes to account for all, even the moſt ſtriking operations of animals; affirming, that, in conſequence of impreſſions made on the brain, by means of the ſenſitive organs, and by the re-action of the brain and nerves on the muſcles, theſe machines acquire a motion conformable to the nature of the animal, and of the impreſſions of the different objects which act upon their organs, and excite deſire or averſion. See BRUTES.

The pre-eſtabliſhed harmony of Leibnitz has alſo been applied to explain the actions of brute animals. Others have conſidered the actions of animals as produced by the conſtant and immediate influence of the divine energy, directing all their inclinations and motions: ſuch appears to have been the opinion of Mr. Addiſon, in the ſecond volume of the Spectator. The late ingenious Hermann Samuel Reimar, profeſſor of philoſophy at Hamburgh, has enumerated and expoſed theſe and other opinions, with regard to the inſtinct of animals, in his Obſervations Phyſiques, &c. publiſhed in two vols. 12mo. at Amſterdam and Paris, 1770: and, defining inſtinct, in the moſt comprehenſive ſenſe of the word, to be every natural inclination, accompanied with a power, in animals, to perform certain actions, divides inſtincts into three heads. The firſt, which he calls *mechanical inſtincts*, belong to the body conſidered as an organized ſubſtance, and are exerciſed blindly and independently of the will of the animal. Such are thoſe which produce the motion of the heart and lungs, the contraction and dilatation of the pupil, digeſtion, &c. This claſs of inſtincts is poſſeſſed in common both by men and brutes, and in ſome meaſure even by vegetables. The ſecond claſs comprehends thoſe which he terms *repreſentative* inſtincts, which conſiſt partly in the power of perceiving external objects by their preſent impreſſion on the ſenſes, and partly in the faculty of rendering the ideas of theſe objects preſent to the mind by the powers of imagination, or of memory, in a lax ſenſe of the word. Theſe are common to men and other animals, excepting that brutes poſſeſs only the faculty of imagination in common with us, and not that of memory, in the ſtrict and proper ſenſe of the word. Indeed this author endeavours to prove, that the knowledge of brutes does not merely differ in degree from that of man, but that it is of a kind entirely different from it; and that they are incapable both of memory and reaſoning: the faculty of imagination ſerving to give them a confuſed idea of events that are paſt, by the view, or other impreſſions of objects that are preſent. The third and principal claſs of inſtincts is that which comprehends all thoſe which M. Reimar calls *ſpontaneous*. This ſpecies of inſtinct is not attended with any power of reflection, determining the animal to decide freely between two different modes of action preſent to his imagination; nor is it merely corporeal or mechanical. It is put into action by the natural and primitive principle of ſelf-love, implanted in all animated beings; or by a love of pleaſure and averſion to pain, producing a voluntary inclination to perform certain actions which tend to their well-being and preſervation. To the performance of theſe actions they are particularly prompted by their preſent ſenſations, by imagination ſupplying the place of memory, and by other cauſes. The wonderful effects produced by theſe inſtinctive appetites, are farther to be attributed to the exquiſite mechaniſm in their bodily conformation, particularly in the ſtructure of the various organs with which they execute their operations, and to the ſuperior perfection and acuteneſs of their external ſenſes, by which they are quickly and diſtinctly informed of thoſe qualities of objects which moſt materially concern them. In order to account for the more curious and ſurpriſing operations of brute animals, M. Reimar adds two other principles, *viz.* 1ſt, an internal diſtinct perception of the preciſe power and proper uſe of their various bodily organs, together with an innate knowledge of the qualities of thoſe objects around them in which they are intereſted; and, 2dly, certain innate and determinate powers and inclinations, impreſſed by the Author of nature, *à priori*, on the ſoul itſelf; by which they are arbitrarily, and without their own knowledge or conſciouſneſs, directed and irreſiſtibly impelled to the performance of theſe various operations which they execute with ſuch unremitting induſtry and art. Theſe determinate forces, which conſtitute the principal part of M. Reimar's ſyſtem, are no where ſo viſible and diſtinguiſhable as in that numerous ſet of inſtincts which he claſſes under the title of the *induſtrious* inſtincts of animals. For a farther account of this ſyſtem we muſt refer to the work itſelf, or to an abſtract of it, with ſeveral of the author's illuſtrations, in the Monthly Review, vol. xlv. p. 533, &c.

The majority of philoſophers, even in Des Cartes's time, maintained, that the actions of the brutes were moſtly *inſtinctive*, and not mechanical. This prevailing ſentiment was altered a little by a wrong application of the principles of Locke. But the balance was ſoon afterwards reſtored to its former preponderance in behalf of *inſtinctive* principles, by the writings of lord Shafteſbury and Dr. Hutcheſon; and ſtill more particularly by thoſe of Dr. Reid. Some authors, who, with Locke, reject innate notions and innate principles, both ſpeculative and practical, allow that the mind acts ſometimes *inſtinctively*; others, who reject Locke's ideal theory altogether, detail a great number of inſtinctive principles of mind; whilſt a third claſs of writers will have the actions, that have been generally denominated *inſtinctive*, to be either habitual, aſſociated, or mechanical. Nor does the matter reſt here: for ſome authors of a very modern date go ſo far even as to maintain that the word inſtinct is unphiloſophical; ſince all that has been referred to this principle, whether in man or in the brutes, may be the reſult of experience, or of imitation.

Some writers confound the actions that have been generally deemed *inſtinctive* with thoſe that ſpring from *reaſon;* ſome with thoſe that ſpring from *mechaniſm;* and others with ſuch as ſpring from *habit* and *aſſociation.* But it is eaſy, we think, to diſtinguiſh them from each and all of theſe, by pointing out actions which differ from ſuch as are called *rational, habitual,* or *mechanical.* An action is called *rational* when it is performed under the influence of a *motive;* that is, *with a view to conſequences:* Thus, to worſhip the Deity for having created us, for his goodneſs towards us, and that he may reward us hereafter, is a *rational action.* Some are of opinion that the *motive,* or the end we have in view in our *rational actions,* is the cauſe of theſe actions; but for our part, as we think that the human mind can act not only in oppoſition to the ſtrongeſt *external motive,* but againſt all external motives whatever, *properly ſo called,* we cannot help thinking it more correct to call them ſimply *inducements,* and to conſider the mind itſelf ſolely and properly as the *cauſe.* *Mechanical* actions alſo have a cauſe as well as thoſe that are rational; namely, *mechaniſm* or *organization.* But this cauſe is not an end propoſed, or a *motive;* neither is it an inward feeling, diſpoſition, or ſenſation: Thus a clock goes through its courſe of hours, minutes, and ſeconds, without a view to conſequences, without *ſpontaneity,* and even without being able to check its own action. To this claſs belong the actions of the heart and arteries, the vermicular action of the inteſtines, and thoſe of ſecretion and reſpiration in animals. *Inſtinctive* actions may be traced to a cauſe as well as both the preceding; but this cannot be referred to the claſs of *motives,* as they are not performed with a view to conſequences; neither can the cauſe be ſaid to be *mechaniſm,* as they are accompanied with *ſpontaneity.* The proper cauſe, however, is the *internal feeling, ſenſation,* or *diſpoſition,* that leads to the performance of them, without deſign or intelligence, on the part of the animal. Thus an infant, in a few minutes after birth, ſeeks the breaſt without any knowledge whatever of its neceſſity for his preſervation; and a pair of young birds, without teaching or experience, build their firſt neſt with as much ſkill and exactneſs as the oldeſt of their tribe could do; and that, too, of the cuſtomary materials of their ſpecies, and in the ſituations beſt calculated for depoſiting and hatching their eggs. *Inſtinct* and *mechaniſm* have been oftener confounded with each other, particularly of late, than any other of thoſe principles of action which we are conſidering; and yet we cannot help thinking that the diſtinction between *habit* and *inſtinct* will not appear as palpable as thoſe we have already made, particularly as ſome *habits* are formed at ſo early an age that it is very difficult to aſcertain whether the actions that ſpring from them are from *habit* or from *nature.* But ſuppoſing ſuch a principle as inſtinct, ſuch as we have deſcribed it, the actions that ſpring from it muſt differ from ſuch as are habitual in this, "that the former muſt be from *nature,* and the latter *acquired.*" Habit has been defined to be a facility of doing, and not only a facility, but alſo a proneneſs to do certain things from having done them frequently before. This definition, however, is manifeſtly not applicable to *habits of art,* but only to ſuch as can be properly called *principles of action.* (See Habit.) Inſtinctive actions agree with habitual ones of the latter kind in this, that they are both performed without intelligence, will, or deſign; and this has accordingly induced Dr. Reid to confound them, and to claſs them, very improperly we think, under the head of mechanical actions. Their agreeing in a few particulars could not warrant him in reducing them to the ſame claſs, particularly when he tells us himſelf, that "the origin of one is natural, of the other acquired." But, beſides this, the habitual actions of man ſeem to want altogether that *ſpontaneity* which we obſerve in the inſtinctive actions of the other animals; ſuch as neſt-building, for inſtance, and the operations of bees, deſcribed in a ſubſequent part of this article, or the migrations of birds of paſſage "through the pathleſs air without chart or compaſs." One inſtance of an action confeſſedly habitual will illuſtrate this more fully. Let us take that motion of the eye-lids which occurs almoſt every inſtant. This action cannot be the neceſſary reſult of mechaniſm, as we ſee that children do not, for ſome days after birth, cloſe their eye-lids on the approach of external objects. But as ſoon as ſome object (ſuppoſe too much light) has made them feel inconvenience or pain, and thus produced a voluntary or mechanical motion of the eye-lids, this effect becomes gradually ſo intimately aſſociated with its cauſe, that even the appearance of the candle will produce the effect. And, finally, habit gives us ſo great a proneneſs to this action, that we perform it conſtantly, amidſt all our occupations, without conſciouſneſs, will, or ſpontaneity; and even without perceiving that, in every waking minute of our lives, we are ſeveral moments totally in the dark. And ſo far is this motion from being a voluntary act, that it requires a ſtrong exertion of will and attention to check it, even for a ſhort time; but do what we will, we can never check it altogether. To avoid being miſunderſtood, it will be neceſſary to illuſtrate more fully the diſtinction between *habits of art,* in which we acquire a facility only from frequent practice, ſuch as playing expertly on the violin or harpſichord, and *thoſe habits,* which, beſides *a facility,* induce alſo a *proneneſs* to act; for inſtance, in that motion of the eye-lids juſt deſcribed, and many other awkward motions and habits learned from bad example and bad company. This is the more neceſſary, as it has not been illuſtrated ſufficiently by any author with whom we are acquainted; and forcibly calls to our recollection the words of a French writer, who remarks: "Tout ſe tient dans un certain ordre de ſpéculations: Voulez vous développer une verité? Il faut en éclaircir vingt autres, qui l'avoiſinent, et dont la lumiere vient, pour ainſi dire, l'éclairer par réflexion." Habits of the latter kind may be properly called *principles* of action; *habits of art* cannot. Theſe require thought, attention, and will in the performance of their operations; whilſt the others require no ſmall exertion of thought, attention, and will to check them. Nor can they, even thus, be completely overcome, until, by repeated exertions, a counter habit is eſtabliſhed, which is the beſt way to obviate their effects. It was this that made Dr. Reid ſay, "I conceive it to be a part of our conſtitution, that what we have been accuſtomed to do we acquire not only a facility, but a proneneſs to do on like occaſions; ſo that it requires a particular will or effort to forbear it, but to do it requires, very often, no will at all. We are carried by habit, as by a ſtream in ſwimming, if we make no reſiſtance." Dr. Reid diſtinguiſhes theſe two ſpecies of habits as we do; but in ſome paſſages he ſeems to confound them, for he claſſes them and inſtinct under the head of mechanical principles. Thus, he ſays, "Habit differs from inſtinct, not in its nature but in its origin; the latter being natural, the former acquired. Both operate without will or intention, without thought, and therefore may be called mechanical principles." (See Habit.) From both theſe paſſages it would ſeem that he meant habit in general; for the aſſertions are not qualified in any ſhape. If ſuch was his opinion, his doctrine agrees exactly with that of Dr. Hartley, whoſe language affords no opportunity for being in doubt about his meaning. But, for our part, we cannot help thinking it more philoſophical to admit any poſſibly conceivable rapidity in our intellectual operations. than to ſuppoſe, that any action performed with ſo much correctneſs, and with ſuch rapidity, as violin and harpſichord playing in ſome inſtances, can be merely habitual, or automatic ; that is, in every one of its minute ſub-diviſions altogether unconnected with the exertions of the will. In habits of art, then, we deem it more correct to admit the interference of the will ; but in the other claſs, which only, becauſe they give not merely a facility, but alſo a proneneſs to act, ought to be called principles of action, we ſee no reaſon for admitting its interference in any reſpect. A different opinion ſeems to be maintained in a late elegant treatiſe, for whoſe author we have a high reſpect. Upon this we ſhall offer a few remarks ; but we have not as yet done with Dr. Reid. After having attentively examined what he has written on this ſubject, we do not think that he intended to include *habits of art* in the paſſages cited above. Surely ſo correct an obſerver of nature could not think, that in *habits of art*, ſuch as pin-making and violin playing, we acquire, from frequent doing, "not merely a *facility*, but alſo a *proneneſs* to do the ſame thing on like occaſions." In all habits of art we acquire more or leſs of facility, but ſurely no proneneſs, as Dr. Reid aſſerts of the habits he had in view in one of the paſſages cited above : for who can aſſert with any truth, that a violin-player feels a particular proneneſs, or inward impulſe, to play upon that favourite inſtrument, as often as it is preſented to him ? And yet he has acquired a facility in playing, from having often played before. The truth ſeems to be, that Dr. Reid, after ſtating the diſtinction of habits already mentioned, threw the *habits of art* into the back ground altogether. This, indeed, is ſtrongly confirmed by the circumſtance, that in the eſſay and chapters to which we allude, he treats only of what can be called *principles of action*, which he defines to be "every thing that incites us to act ;" and particularly when he tells us that *habits of art*, ſince they give only a facility, cannot with propriety be called principles of action. "Habit," he ſays, "is commonly defined *a facility of doing a thing, acquired by having done it frequently*. This definition is ſufficient for habits of art ; but the habits which may, with propriety, be called principles of action, muſt give more than a facility, they muſt give an inclination, or impulſe, to do the action ; and that, in many caſes, habits have this force, cannot be doubted." It deſerves to be remarked, that in this paſſage he does not ſay, that habits give a *proneneſs* (in his own words, an inclination or impulſe) to act in *every caſe*, which he ſhould have done, if he meant to bring habits of art under the obſervation. He only ſays, "that habits give an inclination or impulſe *in many caſes* ;" which ſeems to prove, that he meant only "thoſe habits, which may, with propriety, be called principles of action." This opinion is ſtill further ſtrengthened by the following extract : "Ariſtotle makes wiſdom, prudence, good ſenſe, ſcience and art, as well as the moral virtues and vices, to be *habits*. If he meant no more, by giving this name to all thoſe intellectual and moral qualities, than that they are all ſtrengthened and confirmed by repeated acts, this is undoubtedly true. I take the word in a leſs extenſive ſenſe, when I conſider *habits as principles of action*. I conceive it, &c." (as quoted above.) In this extract he tells us, that he takes the word habit in a confined ſenſe, meaning only ſuch *habits* as he calls *principles of action*. And he has already told us, that *habits of art* do not come under that denomination. If the latter part only of the paragraph be attended to, it ſeems to ſhew that Dr. Reid held the ſame opinion on this point with Hartley ; but if the whole be taken together, and interpreted with fairneſs, and conſidered in connection with our remarks on the ſubject, we think it will appear more probable, that Dr. Reid meant only a particular ſpecies of habits, thoſe which he calls *principles of action*, and that he did not intend to characterize ſuch habitual actions as violin and harpſichord-playing, as *involuntary* and *mechanical*. It muſt not be concealed, that profeſſor Stewart of Edinburgh ſeems to think otherwiſe of Dr. Reid's meaning ; and that he has proved, partly in conſequence of that opinion, that ſome of our habitual actions are under the guidance of the will. From the preceding remarks it will appear, that our opinion differs not from the learned profeſſor's, if he means only *habits of art :* but if he means to bring the other claſs of habits under the influence of the will, (as it is probable he does, for he talks of habitual actions in general, and does not even hint at a diſtinction,) we cannot help thinking, as even analogy itſelf affords no ſupport to this opinion, that he was ſwayed too much by an over-ardent zeal for premature generalization. It deſerves to be remarked, as an additional proof of the fairneſs with which we have interpreted Dr. Reid's opinion, that he ſays nothing of *habits of art* in his chapter on habit, except mentioning one ſolitary inſtance, merely to ſhew "the power of habits and their utility ;" whereas he expreſsly mentions, as belonging to that ſpecies which he calls *principles of action*, many "awkward habits in addreſs, motion, looks, geſture, and pronunciation, acquired by frequenting bad company ; to forbear which, when fully formed, a general reſolution (he ſays) is not ſufficient." He even affirms, that particular attention is neceſſary, on every occaſion, to reſiſt their impulſe, until they be undone by the habit of oppoſing them ; for *theſe habits* operate without intention." It is remarked by profeſſor Stewart, on the ſubject of habitual actions, "that the circumſtance of our inability to recollect our volitions does not authorize us to diſpute their poſſibility." To this obſervation we have no objection ; but when he further contends "that it does not add any force to the objection, to urge, that there are inſtances in which we find it difficult, or perhaps impoſſible, to check our habitual actions by a contrary volition ;" we muſt remark, that this very circumſtance, ſince it has not been obviated, renders the objection inſuperable, and the doctrine againſt which it militates, ſo far as that relates to the ſpecies of habits which we have called *principles of action*, altogether inconcluſive. Let any one try, by the moſt firm and perſevering efforts, to check for a ſhort time the moſt common of all habits, that of cloſing the eyelids, and he will find, though he may ſucceed for a few moments, that he cannot do ſo altogether. Nor is it an anſwer to this fact to ſay "that the contrary volition does not remain with us ſteadily, during the whole operation ; but is merely a general intention, or reſolution, which is baniſhed from the mind as ſoon as the occaſion preſents itſelf, with which the habitual train of our thoughts and volitions is aſſociated." For the time requiſite for trying this experiment, and being defeated in it, is ſo very ſhort, that the contrary volition may be eaſily kept in view, all the while, without its dwindling away into "a general intention or reſolution ;" and beſides, if the perſon who tries the experiment, thinks that he is unable to keep up the counter-volition ſteadily himſelf, he can eaſily have an aſſiſtant or two, to ſit near him, and remind him to keep his thoughts and attention fixed upon the object in view. Some may perhaps urge that this motion of the eyelids is *inſtinctive ;* but by the learned profeſſor himſelf it is allowed to be habitual. We may beſides remark, that there is a wide difference between our being unable to recollect the volitions, which in this theory are ſuppoſed to precede all our habitual actions, and that ſtate of mind in which we are not only not conſcious of any ſuch volitions, but fully aware that the habitual actions occur, even when we are conſcious of having exerted the ſtrongeſt efforts of volition to prevent them. But to conclude this preliminary, but neceſſary, diſcuſſion, we may, by way of recapitulation, obſerve, if the expoſition we have been giving be correct, that the difference between the four ſpecies of actions under one conſideration conſiſts nearly in the following circumſtances. That *rational* actions are done with *intelligence*, *will*, and *deſign* on the part of the agent; *inſtinctive* actions *ſpontaneouſly*, but with no proper intelligence or deſign in the doer; *mechanical* actions without will, *ſpontaneity*, deſign or intelligence; and *habitual* actions, like mechanical ones, (we mean the habits that may be properly called principles of action,) without ſpontaneity, deſign, or intelligence; but differing in this, that they are *accidental* in their origin, and in many inſtances capable of being checked and even removed by contrary habits; whereas *mechanical* actions, properly ſo called, are in a manner neceſſary in their origin (for inſtance circulation, ſecretion and reſpiration in animals), and can never be removed or ſuppreſſed altogether, without the deſtruction of the animal, by any voluntary effort of ours.

As we are of opinion, that the origin at leaſt of ſome of the actions of man cannot be explained, unleſs we admit the exiſtence of ſuch a principle as inſtinct, it becomes neceſſary to conſider ſome of thoſe actions of the lower animals, which are generally allowed to be inſtinctive. This ſtep ſeems the more neceſſary, as the exiſtence of inſtinct, even in the lower animals, ſeems of late to have been wholly denied, ſince it has been aſſerted, in a "New Syſtem of the Natural Hiſtory of Animals," publiſhed in Edinburgh, in 3 vols. 8vo. by Peter Hill, in 1791; "that the laws of analogical reaſoning do not juſtify the opinion, that the brutes act, on any occaſion, abſolutely without deſign." Whilſt, on the other hand, it has been maintained by Mr. Smellie, in his "Philoſophy of Natural Hiſtory," "that between reaſon and inſtinct there is no difference, and that the reaſoning faculty is itſelf the neceſſary reſult of inſtinct." Nothing can be more directly oppoſite than both theſe opinions; and like moſt extremes, nothing can be more eaſily ſhewn to be falſe. To prove that ſome of the natural operations of the lower animals are not performed with deſign, or with a view to conſequences, in oppoſition to the former, many examples will not be neceſſary; and firſt, let us attend to the operations of the winged tribe. The youngeſt pair of birds, it is known, without inſtruction or experience, build their firſt neſt of the materials commonly uſed by their ſpecies; in ſituations, whoſe privacy, &c. render them fit to afford them ſecurity, and convenient for incubation and the rearing of their young. It is alſo certain, that they ſhew equal ſkill with the oldeſt and moſt practiſed of their tribe, in the neatneſs, accuracy, and ſymmetry of their work. It is further known, whenever the climate or ſituation, or any change of circumſtances renders a change in the ſtructure of neſts neceſſary, that this change is made by all the individuals (young and old) of the ſame ſpecies equally, and that only when ſuch a change is neceſſary. Thus, "in countries infeſted with monkies, many birds, which, in other climates, build in buſhes and clefts of trees, ſuſpend their neſts upon ſlender twigs, and, by this ingenious device, elude the rapacity of their enemies." It is moreover certain, that no improvement has been made, within the memory of man, in the art of neſt-building, by any tribe, or by any of its individuals. Now the nature of all the arts with which we are acquainted is ſuch, and their hiſtory ſhews us, that they were firſt invented by ſome perſon, and then improved in the courſe of time, either by the inventor or by others, and finally brought to ſome degree of perfection. Hiſtory and experience alſo ſhew, that human arts are beſt known and practiſed with moſt ſkill and dexterity in general, by thoſe only to whom they have been taught; and that in different ages and countries they all undergo conſiderable variations. But in the arts of animals we obſerve no ſuch variations; nor can any individual be pointed out as the inventor, the improver, or the perfector of any of them; for inſtance, of neſt-building. Each of them is perfectly ſkilled in the workmanſhip of its tribe; we do not ſay that they know the nature and the rules of the different arts which they practiſe; but that they are acquainted with the mode of working in them to perfection. How many very ſimple arts do we daily ſee practiſed by our ſpecies, without being able to practiſe them, or learn them ourſelves. What a long apprenticeſhip is generally neceſſary before we can practiſe even ſome of the moſt common and neceſſary. A peaſant ſpends months and years under his ſimple roof, and yet is not able often to build ſuch a hut as that he inhabits. Birds require no ſuch teaching or experience: they ſerved no apprenticeſhips; and yet a pair of young birds kept ſolitary and ſequeſtered from their infancy, build exactly ſuch another neſt as that in which they themſelves had been brought into life. But what is the inference to be drawn from theſe facts? If the natural actions of the lower animals, for inſtance this of neſt-building, be all under the influence of motives, in other words, *rational*; we muſt conclude, ſince they are ſo invariable, either that their workmanſhip is perfect beyond the reach of improvement, or ſo imperfect as not to be capable of degenerating. The former of theſe concluſions cannot be ſupported, unleſs it be contended at the ſame time, that the lower animals have made more early and greater diſcoveries and advances in the arts and ſciences than we have. Nor will the latter be maintained by any man, who conſiders the ſtructure of a honey-comb, or who reflects, that all the ſkill of man has never yet excelled the workmanſhip even of a wren in the ſtructure of ſuch a neſt as he builds. However, if the ſuppoſition be admitted, the former ſeems the better inference. But, if this doctrine be true, we muſt ſay, that birds are good judges of climate and circumſtances; that they know the dangers and advantages reſulting from them, and the beſt methods for obviating the former and ſecuring the latter. We muſt ſay, that reaſoning ſhews them the neceſſity of equality in the ſtructure of their neſts; or when, after having been abſent for ſome time, they turn their eggs ſo as to heat them properly, and at all times equally, we muſt think, that they know heat, and even an equal diſtribution of it, to be neceſſary for incubation. But as none of theſe can, we think, be affirmed with the ſmalleſt appearance of truth, and ſince thoſe actions of birds are, without teaching, habit, or experience as perfectly performed by the young as by the old, and always ſo invariable, we muſt conclude, that in theſe inſtances we diſcover not the reaſoning of animals, pointing to conſequences and deviſing means, but the unerring reaſon and wiſdom of *Him* who made them, and implanted ſuch principles in their conſtitutions as guide them unceaſingly in the performance of their various natural operations, the complete purpoſes and utility of which *He* only knows. Our reaſoning is confirmed by that of Addiſon—"What," ſays he, "can we call the principle which directs every different kind of bird to obſerve a particular plan in the ſtructure of its neſt, and directs all of the ſame ſpecies to work after the ſame model? It cannot be *imitation*; for though you hatch a crow under a hen, and never let it ſee any of the works of its own kind, the neſt it makes ſhall be the ſame, to the laying of a ſtick, with all the other neſts of the ſame ſpecies. It cannot be *reaſon;* for were animals endued with it to as great a degree as man, their buildings would be as different as our's, according to the different conveniences that they would propoſe to themſelves." Some birds diſplay a wonderful ſhare of ſagacity in the proceſs of incubation and in rearing their young. Without attentive and cautious obſervation, one would be almoſt poſitive, that in every ſtep they are guided by reaſon. But it is eaſy to ſhew that this is not the caſe. Let us take a very familiar inſtance: a hen ſeeks a ſilent and an unfrequented place for her neſt; when ſhe has laid her eggs and began to cover them, ſhe takes care to turn them frequently, that the vital warmth may be communicated to all parts of them. When ſhe is obliged to leave them, in order to procure food, ſhe is ſure to return before they have time to cool, which would render them incapable of producing chickens. In ſummer ſhe will often ſtay away for two hours; but in winter, when the cold would deſtroy the principle of life, ſhe ſtays away a much ſhorter time. When the birth approaches, with how much nicety and attention does ſhe help the little ones to break their priſon. When brought forth, how cautiouſly does ſhe cover them from the injuries of the weather, provide them proper nouriſhment, and teach them to help themſelves. It deſerves alſo to be remarked, that ſhe forſakes the neſt if, after the uſual time of reckoning, the young do not begin to make their appearance. Can any thing have a greater appearance of reaſon and ſagacity than all this. "But, at the ſame time, the hen that has all this ſeeming ingenuity (which is indeed abſolutely neceſſary for the propagation of the ſpecies), conſidered in other reſpects has not the leaſt glimmering of thought or common ſenſe. She miſtakes a piece of chalk for an egg; and ſits upon it in the ſame manner; ſhe is inſenſible of any increaſe or diminution in the number of thoſe ſhe lays; ſhe does not diſtinguiſh between her own and thoſe of another ſpecies; and when the birth appears of ever ſo different a bird will cheriſh it for her own. In all theſe circumſtances, which do not carry an immediate regard to the ſubſiſtence of herſelf or her ſpecies, ſhe is a very idiot." None of theſe inſtances juſtifies the doctrine, "that animals, in all their natural operations, act with a view to conſequences." To confirm our reaſoning and opinion ſtill farther, out of the numberleſs examples afforded us by Natural Hiſtory, we ſhall content ourſelves with one, which, if we miſtake not very much, is deciſive of this quſtion. This we take from the operations of the bee, as it ſeems to act with a view to conſequences, and to be, as was ſaid of the ant, "haud ignara et non incauta futuri." Let us attend a little to the ſtructure of a honeycomb. The cells of the bees are equal and ſimilar; and of the three poſſible ways in which this can be effected, they have choſen the beſt for holding their honey and rearing their young. The cells are built on both ſides: they may then be placed exactly oppoſite one another, ſo that two would reſt upon the ſame bottom; or they may be ſo placed, that the bottom of one will reſt upon the point where the partitions meet on the oppoſite ſide. This latter mode gives them more ſtrength, and they are accordingly built thus. Further, the bottoms of the cells are not planes perpendicular to the ſides, but conſiſt of three planes meeting in a ſolid angle in the centre, exactly where the partitions on the oppoſite ſide croſs one another. And it has been demonſtrated, that this makes the cells ſimilar without loſs of room, and conſiderably ſpares both labour and materials. Thus, then, it is ſhewn, that bees build their cells ſo as as loſe no room; to have no uſeleſs partitions; in the ſtrongeſt poſſible manner; and with the leaſt poſſible expence of labour and materials. All this, as far as geometry and mathematics can ſhew it, has been rigorouſly demonſtrated by Mr. Maclaurin, and proves them, on the ſuppoſition that they act with a view to conſequences in this inſtance, more ſkilled in both theſe inſtances than the moſt philoſophical and learned men; and that too from the earlieſt ages. But as this is a doctrine too improbable to be inſiſted upon, we muſt rather conclude, that the bees, although they act geometrically, underſtand neither the rules nor the principles of the arts which they practiſe with ſuch accuracy; but that the geometry in this inſtance is in the Maker of the bee, "that Great Geometer, who made all things in number, weight, and meaſure." (Reid's Active Powers of Man, and the London Philoſophical Tranſactions.) Were a man to conſtruct ſo nice a piece of workmanſhip as a honeycomb, we ſhould immediately conclude, that he worked according to rule, and underſtood the principles upon which he proceeded. Is it neceſſary to remark, that we have no reaſon whatever for thinking, that bees underſtand one or the other? In the moſt complicated works of human contrivance, a man of equal knowledge and ſkill will comprehend the principles and general deſign of the artiſt: but to underſtand the rules and principles, which are ſo rigorouſly adhered to in the conſtructing of a honeycomb, is, and will always be, beyond the comprehenſion of the far greateſt part of mankind. The few inſtances of animal *inſtinctive* operations, which we have now briefly detailed, will, we hope, be ſufficient for the preſent: they correſpond fully with our notion and explanation of inſtinct, and ſerve our purpoſe, as well as a million of inſtances crowded together. But it is objected, that this inſtinct, which we call a ſimple, original principle, accommodates itſelf to circumſtances; that it is improved by experience and imitation; that no ſuch accommodation to circumſtances can take place without reaſoning, or a compariſon of ideas; and, therefore, that this principle of the conſtitution of the lower animals is not *inſtinct*, but *reaſon*. The inſtances to prove that inſtinct accommodates itſelf to circumſtances are numerous. Birds ſtay away from their eggs longer in warm than cold weather. The oſtrich in Senegal, where the heat is great, neglects her eggs during the day, but ſits on them during the night: but at the Cape of Good Hope, where the heat is leſs, ſhe ſits on them both night and day. In countries infeſted with monkies, birds, which in other climates build in buſhes and clefts of trees, ſuſpend their neſts upon ſlender twigs, and thus elude their enemies. The ſame ſpecies of birds build their neſts differently, when climate and circumſtances require it. We have numberleſs inſtances of this accommodation to circumſtances in the pairing inſtincts of animals. None, it has been obſerved, ever pair, except thoſe whoſe young require the nurſing care of both the parents. The extent and continuance of the parental care are in the proportion of the wants and helpleſſneſs of the young. When the wants of the young ceaſe, the mother withdraws her fondneſs, and leaves them to provide for themſelves; but the love of the parent may be lengthened out beyond its uſual time, as we ſee in birds, which continue to feed their young, if they are tied to the neſt, or confined within a cage, or by any other means appear to be out of a condition of ſupplying their own neceſſities. This laſt inſtance, whilſt it very finely exemplifies an accommodating inſtinct, affords the happieſt proof of the guardian care of a kind and parental Providence. In anſwer to the objection which theſe facts contain, it may be firſt obſerved, that taking inſtinct, as it is generally defined, to be a principle in the conſtitution of animals, given them by their Maker, for the purpoſe of preſerving the individuals and continuing the kind, in other words, a prediſpoſition to perform certain actions neceſſary for theſe ends, when incited by certain feelings or ſenſations, that its accommodating itſelf to circumſtances and ſituations is no argument againſt its exiſtence, nor a good proof, that it is the reſult of reaſoning; ſince *He*, who made it a part of the conſtitution of his creatures, knows, that the ſame ends muſt be often ſought by different means, particularly when times, places, and circumſtances are altered; and only manifeſts his wiſdom and goodneſs the more, by conſtituting this principle of ſuch a nature, as to vary when requiſite, and to change only when ſuch a change is neceſſary. Let us add to this, that did He not impart this accommodating property to inſtinct, it would not produce the effects for which it ſeems intended; as we know it to be impoſſible, that ſimilar means ſhould produce ſimilar effects, when circumſtances, climates, and ſituations, are different. Indeed this accommodating peculiarity, ſo far from being a good argument againſt it, is a neceſſary conſequence of inſtinct. The abettors of this principle do not maintain, that the accommodating variations will take place on every occaſion. They will occur only where the diſadvantages exiſt, againſt which the inſtinct is intended to provide. Inſtinctive actions take place when certain ſenſations exiſt, and when theſe do not exiſt, we cannot wonder that the actions do not occur. In the following remarks we follow the learned author of "Ancient Metaphyſics," a work, in which we find a juſt view of the ſubject of inſtinct. Before we poſitively conclude, that no accommodation to circumſtances can take place without reaſoning, or a compariſon of ideas, it may not be irrelevant to conſider ſome of the appearances which the vegetable and inanimate worlds exhibit. If, becauſe the operations of ſome animals are ſo artificial, and becauſe they ſometimes accommodate their actions to circumſtances, we muſt ſay, that they reaſon and compare ideas, we muſt contend, that vegetables and inanimate bodies do ſo likewiſe: we know, that a vegetable reared in a dark cellar, if ſome light be admitted, will bend itſelf towards the light: or, if made to grow in a flower-pot with its head downwards, that it will turn its head upwards, according to the natural poſition of a plant. Can it be maintained, that the plant in either caſe does what it does from any judgment or opinion, that it is beſt, and not from a neceſſary determination of its nature? The facts taken from the inanimate world are equally in point. How ſhall we account for the phenomena of elective attractions? when one body unites with another, and then, if a third is preſented to it, quits the firſt and unites itſelf with the other, ſhall we ſay that this is the effect of reaſoning and of a compariſon of ideas, and ſuppoſe, that this preference of the one to the other proceeds from any predilection or opinion, that it is better to cleave to one than to the other? What ſhall we ſay of the cryſtallizations and configurations of ſalts exhibited to us by the microſcope, ſo various and yet ſo conſtant and regular? Muſt we ſay, that their minute particles reaſon and compare ideas, becauſe their operations are ſo various, and, at the ſame time, ſo regular and conſtant? Or, if nobody affirms this, why ſhould we think, that the actions of animals, not more various and ſurprizing, not more conſtant or regular, than theſe motions of the ſalts, ſhould be the reſult of reaſoning and of a deduction of inferences? Should we not rather affirm, as thoſe inanimate ſubſtances arrange themſelves ſo regularly, and yet ſo variouſly, upon different occaſions, in conſequence of an original law of nature, that the benevolent Author of all ſuch laws, intending to diſplay his providence and wiſdom ſtill more conſpicuouſly in his animal kingdom, beſtowed upon his creatures this accommodating inſtinct, without which, (ſuppoſing that they act inſtinctively on any occaſion) the great purpoſes of their propagation and preſervation could never be attained? This objection, upon which we have been commenting, is contained in the "Syſtem of Natural Hiſtory" already mentioned in this article. The compilers of that work have been carried much too far in their zeal to do away Mr. Smellie's very unphiloſophical notions concerning inſtinct: and, although we have read over their opinions with much attention, we are ſtill at a loſs in ſome parts to comprehend their meaning. Their diſſertation on the ſubject is but ſhort, and yet, we think, they often contradict themſelves. One time you would ſuppoſe, that they admit ſuch a principle as inſtinct in the lower animals; at another they ſeem to reject it altogether. This latter, indeed, ſeems to be the faireſt account of their opinions. What theory they had in view, when they called inſtinct a *mechanical* principle, we know not. It could not be the exploded doctrine of Des Cartes, nor the equally unphiloſophical theory of Buffon, which has been ſo fully and ſo ably refuted by Condillac. Perhaps they referred to Dr. Reid's, who, as we have already obſerved, calls inſtinct a mechanical principle. We are equally at a loſs for their alluſions, when they call brutes *inſenſible inſtruments* under the influence of inſtinct, which they denominate a "myſterious influence." None of the advocates for inſtinct, ſo far as we know, haev ever held this abſurd opinion. On the contrary, they all allow them not only *ſenſibility*, but even *ſpontaneity*, in their inſtinctive operations. And, when they are allowed to poſſeſs theſe, we cannot deny them *conſciouſneſs*, by which they muſt know that they are acting. The ſupporters of inſtinct aſſert no more than this, ſince ſome of the natural operations of animals are ſo complicated, and yet ſo perfect and invariable, that it is irrational, with ſuch evidence as we poſſeſs, to ſuppoſe them acquainted with the rules of the arts which they practiſe, or the ends for which they operate. Theſe, however, are known to Him, and perhaps to Him only, who implanted ſuch principles in their conſtitutions, as direct them unerringly in all their ways. Beſides thoſe now mentioned, there are ſome other miſtakes and errors in this work on the ſubject under diſcuſſion. Theſe, however, with one exception, we ſhall paſs unnoticed. The error we mean, and which, indeed, is not peculiar to theſe writers, is their ſuppoſing, that the advocates of inſtinct deny reaſon altogether to the brutes. But this opinion is wholly groundleſs. That ſome animals diſplay wonderful ſagacity and docility, that they even reaſon on ſeveral occaſions, is, we think, clear from the moſt ſatisfactory evidence. We ſhall mention a few facts in ſupport of this opinion. On the northern coaſt of Ireland a friend of Dr. Darwin's ſaw above a hundred crows at once preying upon muſcles: each crow took a muſcle up into the air twenty or forty yards high, and let it fall upon the ſtones, and thus, by breaking the ſhell, got poſſeſſion of the animal. A few years ago there was ſhewn at Exeter Change, London, an old monkey, who having loſt his teeth, uſed, when nuts were preſented to him, to take a ſtone in his hand, and crack them with it one by one; thus, uſing means, like the crows in the preceding inſtance, to accompliſh his purpoſes as well as we do. We are told by Linnæus, that the martin dwells on the outſide of houſes in Europe under the eaves; and that, when it has built its neſt, the ſparrow frequently takes poſſeſſion of it. The martin, unable to diſlodge his intruding enemy, convokes his companions, ſome of whom guard the captive, whilſt others bring clay, completely cloſe up the entrance of the neſt, and then fly away, leaving the ſparrow to be ſuffocated,

cated, as the puniſhment due to his injuſtice and temerity. This fact is mentioned in the "Amuſement Philoſophique, &c." of Father Bougeant. There is alſo an inſtance of it in the "Gentleman's Magazine;" in which we find alſo ſome intereſting particulars concerning a raven kept, ſome years ago, at the Red Lion at Hungerford. The account is, however, too long to be tranſcribed, although very much to our preſent purpoſe. We recollect ſeeing, a few years ago, a very ſenſible cat, which, when out at night, would tap regularly at the windows, if the doors and ſhutters were cloſed; knowing by experience, that ſhe was often let in at the windows by day. And what is ſtill a better proof of her reaſoning and ſagacity, ſhe would always tap at the bed-room windows, when diſappointed at the others, or when the night was far advanced. A lady with whom we were acquainted, had a tame bird, which ſhe was in the habit of letting out of its cage about her room every day. One morning as it was picking up ſome crumbs of bread off the carpet, her cat, who always before ſhewed great kindneſs for the bird, ſeized it on a ſudden, and jumped, with it in her mouth, upon a table. The lady, alarmed for the fate of her favourite, on turning about, obſerved that the door had been left open, and that a ſtrange cat had juſt come into the room. After turning it out, her own cat came down from her place of ſafety, and dropped the bird, without injuring, if we may ſo expreſs it, a hair of its head. Cowper's beautiful little poem on the dog and the water lily, gives an amiable inſtance of the reaſoning of the lower animals, which has been ſo ſweetly, and yet with ſuch elegant ſimplicity, told in verſe, that we cannot think of melting it down into the languid coldneſs of proſe. When we ſee brutes thus uſing means to obtain their ends, as well as ourſelves, muſt we not conclude that they reaſon? When the cat watches for hours in ſilent expectation of her prey; when the hound traverſes a wide extent of country in the chace; when the meaneſt inſect that we tread on, drags its wounded frame to a ſafe retreat; they ſhew as much perſevering voluntarity as man can boaſt. No animal manducates its food, or laps its drink, from the mere pleaſure of the motions. It uſes them as means for an end; and if hunger and thirſt were not felt, they would be conſidered as labours, and would not be performed. "Animals (ſays profeſſor Stewart, nearly in the words of Mr. Hume,) are left to make ſome ſmall acquiſitions, by experience, as ſufficiently appears in certain tribes, from the ſagacity of the old, when contraſted with the ignorance of the young; and from the effects which may be produced on many of them, by diſcipline and education."—"It ſeems as evident to me," ſays Mr. Locke, "that ſome animals do, in certain inſtances, reaſon, as that they have ſenſe; but it is only in particular ideas, juſt as they receive them from the ſenſes. They are the beſt of them tied up within thoſe narrow bounds, and have not, as I think, the faculty to enlarge them, by any kind of abſtraction." The obſervations which Mr. Locke makes in this part of his work on the faculties of the brutes, as compared with our's, are in general very juſt and worthy of peruſal. But there are ſeveral facts, which our limits do not allow us to ſtate, from which it is evident that brutes on ſome occaſions exhibit proofs of the power of abſtraction. That an animal can be capable of gratitude and affection for its maſter, without reaſoning, can, we think, hardly be maintained. From the maſter's protection and kindneſs, it infers that it is under obligations to him, which it owes not to another. Before concluding our remarks on the reaſoning of animals, we may quote one inſtance of the affection of a dog, which we think has never been ſurpaſſed. And we do it the more readily, as the circumſtance has been very poetically deſcribed by an author, who, with all his great merits, ſeldom writes better than upon this occaſion. The inſtance to which we allude is very intereſting, from the incident to which it relates, the death of an unfortunate young gentleman of promiſing talents, who periſhed, by loſing his way, in the ſpring of 1805, on the mountain Hellvellyn. His remains were found three months afterwards, guarded ſtill by a terrier bitch, that had long been the companion of his ſolitary rambles. This laſt circumſtance in particular, is very finely alluded to by Mr. Scott, in his little piece on the ſubject, to which he has given the name of Hellvellyn. As the few inſtances now ſtated are ſufficient, and ſpeak fully for themſelves, we ſhall not add to the number, nor ſtop to make any comments upon them. But it has been aſked, if we allow reaſon to the lower animals, in what does the difference between them and man conſiſt? Do their faculties and our's differ in degree, or in kind? To this queſtion we have not the vanity of thinking that we are able to give a ſatisfactory anſwer; we may, however, offer a few remarks. We ſee that animals learn much from experience and obſervation as well as ourſelves. It is thus they learn the nature, or the properties, of the objects that ſurround them, ſuch as heights, depths, diſtances, &c. "A horſe that has been accuſtomed to the field, becomes acquainted with the proper height which he can leap, and will never attempt what exceeds his force and ability. An old greyhound will truſt the more fatiguing part of the chace to the younger, and will place himſelf ſo as to meet the hare in her doubles; nor are the conjectures which he forms on this occaſion, founded in any thing but his obſervation and experience." By training and education we can teach our domeſtic animals much more than they would ever learn, if left to themſelves and their own obſervation. If we put them in new ſituations, we ſee that their acquired knowledge is much increaſed and improved, and that by a proper and ſtrict diſcipline we can train them up to a mode of acting directly contrary to their inſtincts, or natural propenſities. If theſe obſervations be juſt, (and we cannot ſee how they can be queſtioned,) it follows, that in the lower animals inſtinct is ſuſceptible of very great and ſtriking modifications. To produce theſe, however, ſtrict culture and diſcipline are neceſſary; without which, we do not think, that their own experience and obſervation would ever teach them to deviate much from the line of acting chalked out to them by their inſtincts, or original propenſities. And accordingly we agree with a remark of Mr. Hume's, "that though animals learn many parts of their knowledge from obſervation, there are alſo many parts of it which they derive from the original hand of nature, which much exceed the ſhare of capacity they poſſeſs on ordinary occaſions, and in which they improve *little or nothing*, by the longeſt practice and experience." Yet, notwithſtanding this ſuſceptibility of improvement by culture and education in the lower animals, we can never obſerve in them any thing approaching to the knowledge and ſagacity of man. They do not, like him, heap obſervation upon obſervation, they do not improve by the experience of the paſt, nor manifeſt any indications of a regard to futurity; their manufactures are always ſtationary, and all their acquiſitions of knowledge periſh with the individual. They never learn the arts of man; for inſtance, though often as fond of artificial heat as we are, not one of them has been ever known to lay a piece of coal or of wood upon the fire to keep it from going out. All this may be owing to their want of language; but it ſeems ſtrange, that they poſſeſs not this art, as ſome of them ſeem to have organs of articulation, as perfect as our's. They uſe means, it is true, for obtaining their ends ſometimes; but theſe in general are very ſimple and obvious. They reaſon too on ſome occaſions; but the want of language, or of general ſigns, puts it out of their power to reaſon, but on particular facts. The powers of claſſifying objects, of abſtract reaſoning, of uſing artificial ſigns as inſtruments of thought and of mutual communication, ſeem to be almoſt altogether peculiar to man. From theſe conſiderations, and ſeveral others, relating both to the intellectual and moral faculties of man, as contraſted with thoſe of the lower animals, it has been inferred, that the regular chain of being every where elſe obſervable on our globe, fails entirely here, and that their faculties differ from our's, not in degree, but in kind.

Thus then we ſee, that animals perform certain operations that are neither *rational, habitual*, nor *mechanical;* and although it cannot be doubted but ſome of them reaſon in ſeveral inſtances, ſtill, even from the ſhort details now given, we cannot allow, that their natural operations are performed with a view to conſequences. Nor ought the effects of inſtinct, (the labours of birds and bees for inſtance) appear extraordinary to us, when we conſider what aſtoniſhing effects *habit*, which has been happily called "a ſecond nature," enables us to produce. For inſtance, we need go no farther than reading, writing, and playing upon muſical inſtruments, all of which we learn by great attention, pains, and ſtudy; and moſt of all, perhaps, correct and quick extemporary eloquence. And ſurely, when the effects of an acquired principle are ſo very uncommon, it cannot be deemed ſtrange, that an original principle of the conſtitution of animals ſhould perform works ſtill greater or more aſtoniſhing.

INSTITA, a word uſed by the chirurgical writers, for a fillet or other bandage of that kind; and by medicinal writers, for that ſort of flat worms bred in the inteſtines called by many the tape-worm, or flat worm.

INSTITUTE, NATIONAL, *of France*, was newly organized in purſuance of a decree of the French government, with the advice of the council of ſtate, as follows: I. It is now divided into four claſſes, *viz.* 1. Claſs of phyſical and mathematical ſciences. 2. Claſs of French language and literature. 3. Claſs of hiſtory and foreign literature. 4. Claſs of the fine arts.

The actual members and foreign aſſociates of the inſtitute, ſhall be divided into theſe four claſſes.

A committee of five members of the inſtitute, named by the Firſt Conſul, ſhall adjuſt this diviſion, which ſhall be ſubmitted to the approbation of government.

II. The firſt claſs ſhall be formed of the ten ſections which at preſent compoſe the firſt claſs of the inſtitute, with a new ſection of geography and navigation, and eight foreign aſſociates.

The ſections ſhall be compoſed and called as follows:

Mathematical Sciences.	Geometry - - - - - -	6 members.
	Mechanics - - - - - -	6 ditto.
	Aſtronomy - - - - - -	6 ditto.
	Geography and Navigation -	3 ditto.
	General Phyſics - - - -	6 ditto.
Phyſical Sciences.	Chemiſtry - - - - - -	6 members.
	Mineralogy - - - - - -	6 ditto.
	Botany - - - - - - -	6 ditto.
	Rural Economy and Veterinary Art - - - - - - -	6 ditto.
	Anatomy and Zoology - -	6 ditto.
	Medicine and Surgery - -	6 ditto.

The firſt claſs ſhall appoint, with the approbation of the Firſt Conſul, two perpetual ſecretaries, one for the mathematical ſciences, the other for the phyſical ſciences. The perpetual ſecretaries ſhall be members of the claſs, but ſhall not form a part of any ſection.

The firſt claſs may elect ſix of its members from the other claſſes of the inſtitute.

It may name an hundred correſpondents ſelected from the learned men of France and foreign countries.

III. The ſecond claſs ſhall be compoſed of forty members.

It is particularly charged with the compoſition of the dictionary of the French language. It ſhall examine, with reſpect to language, the important works of literature, hiſtory, and the ſciences. The collection of its critical obſervations ſhall be publiſhed at leaſt, four times in a year.

It ſhall name from its own body, and with the approbation of the Firſt Conſul, a perpetual ſecretary, who ſhall continue to be of the number of the forty members which compoſe it.

It may elect twelve of its members from the other claſſes of the inſtitute.

IV. The third claſs ſhall be compoſed of forty members and eight foreign aſſociates.

The object of its reſearches and labours ſhall be learned languages; antiquities and monuments; hiſtory, and all the moral and political ſciences connected with hiſtory. It ſhall particularly apply itſelf to the enriching of French literature with the works of Greek, Latin, and Oriental authors, which have not yet been tranſlated.

It ſhall employ itſelf in the continuation of diplomatic collections.

It ſhall name from its own body, under the approbation of the Firſt Conſul, a perpetual ſecretary, who ſhall be of the number of the forty members which compoſe the claſs.

It may elect nine of its members from the other claſſes of the inſtitute.

It may name ſixty correſpondents, natives or foreigners.

V. The fourth claſs ſhall be compoſed of twenty-eight members and eight foreign aſſociates.

They ſhall be divided into ſections, deſcribed and formed as follows:

Painting - - - - -	10 members.
Sculpture - - - - -	6 ditto.
Architecture - - - -	6 ditto.
Engraving - - - - -	3 ditto.
Muſic (compoſition) - - -	3 ditto.

It ſhall appoint, with the approbation of the Firſt Conſul, a perpetual ſecretary, who ſhall be a member of the claſs, but ſhall not be a part of a ſection.

It may elect ſix of its members from the other claſſes of the inſtitute.

It may name thirty-ſix correſpondents, national or foreign.

VI. The foreign aſſociated members ſhall have a deliberative voice only on ſubjects of ſcience, literature, and the arts; they ſhall not form part of any ſection, nor interfere in any uſage.

VII. The preſent actual national aſſociates of the inſtitute ſhall form part of the one hundred and ninety-ſix correſpondents attached to the claſſes of the ſciences, belles lettres, and fine arts.

Correſpondents may not aſſume the title of members of the inſtitute.

They ſhall loſe that of correſpondent when they ſhall be domiciliated at Paris.

VIII. Nominations to vacant places ſhall be made by each claſs in which the vacancy happens; the perſons elected ſhall be confirmed by the Firſt Conſul.

IX. The members of the four claſſes ſhall enjoy a reciprocal.

cal right to aſſiſt at the particular ſittings of each claſs, and may deliver lectures when they are requeſted.

They ſhall re-unite four times in a year into one body, to communicate their proceedings.

They ſhall elect in common the librarian and under librarian of the inſtitute, as well as all thoſe agents who belong to the inſtitute in common.

Each claſs ſhall preſent for the approbation of the government, the particular ſtatutes and regulations of its internal police.

X. Each claſs ſhall hold one public ſitting every year, at which the other three ſhall aſſiſt.

XI. The inſtitute ſhall receive annually from the public treaſury 1500 fr. for each of its non-aſſociated members, 6000 fr. for each of its perpetual ſecretaries; and for its expences, a ſum which ſhall be fixed every year, upon the demand of the inſtitute, and compriſed in the eſtimates of the miniſter of the interior.

XII. There ſhall be an adminiſtrative committee of the inſtitute, compoſed of five members, two from the firſt claſs, and one from each of the others, named by their reſpective claſſes.

This committee ſhall regulate in the general ſittings preſcribed by art. IX. all that relates to the adminiſtration, to the general expences of the inſtitute, and to the diviſion of its funds between the four claſſes.

Each claſs ſhall afterwards regulate the application of the funds aſſigned to it for its expences, as well as all that concerns the printing and publiſhing its memoirs.

XIII. Every year the claſſes ſhall diſtribute prizes, the number and value of which ſhall be regulated as follows:

The firſt claſs, a prize of 3000 francs.

The ſecond and third claſs, each a prize of 1500 francs.

The fourth claſs, grand prizes of painting, ſculpture, architecture, and muſical compoſition. Thoſe who ſhall have gained one of the grand prizes ſhall be ſent to Rome, and maintained at the expence of government.

The above decree was followed by a ſecond, appointing the members of the different claſſes, and regulating the days of their meeting.

The ſittings of the firſt claſs are to be held every Monday; thoſe of the ſecond claſs every Wedneſday; thoſe of the third every Friday, and thoſe of the fourth every Saturday.

Theſe ſittings are to be held in the ſame place, and to laſt from three o'clock till five.

INSTITUTES, *Inſtituta*, in the *Civil Law*, a book, containing the elements, or principles of the Roman law; and which conſtitutes the laſt part of the *corpus juris civilis*.

The inſtitutes are a compendium, or ſummary of the whole body of civil law, in four books, compoſed by Tribonianus, Theophilus, and Dorotheus, by order of the emperor Juſtinian, for the uſe of young ſtudents; who, having the firſt elements of the whole profeſſion in this little treatiſe, might the ſooner gain a competent knowledge of it without being diſcouraged by the bulk of the other books.

Theſe inſtitutes proceed, with no contemptible method, from I. "Perſons" to II. "Things;" and from things to III. Actions;" and the article IV. of "Private Wrongs" is terminated by the principles of "Criminal Law." For an abridged account of theſe inſtitutes, ſee Gibbon's Decl. and Fall of the Roman Empire, vol. vii. See alſo CIVIL *Law*

INSTITUTES likewiſe denote a ſyſtem of law, or rules in any ſcience.

INSTITUTION, in a general ſenſe, the act of ordaining, founding, or eſtabliſhing any thing.

Thus we ſay, Moſes inſtituted the ceremonies of the old law; Jeſus Chriſt inſtituted the ſacraments of the new.

INSTITUTION, in the *Canon* and *Common Law*, is the act of the biſhop, or of one commiſſioned by him, whereby a clerk, after the patron's preſentation has been admitted, is inveſted with the ſpiritualities of a rectory, or vicarage: for by inſtitution the care of the ſouls of the pariſh is committed to his charge. See PRESENTATION.

The clerk kneels down before the biſhop, whilſt he pronounces theſe words of inſtitution (inſtituo te rectorem eccleſiæ de A. B. cum cura animarum, & accipe curam tuam & meam); and the clerk holds the written inſtrument, with the epiſcopal ſeal annexed, in his hand, during the ceremony.

Before the clerk is inſtituted, he muſt ſubſcribe the thirty-nine articles of religion, in the preſence of the ordinary, or his ſubſtitute; and this ſubſcription muſt be without reſerve, exception, or qualification; elſe his inſtitution is, *ipſo facto*, void and null, and the church ſtill vacant. 13 Eliz. c. 12.— At the ſame time the ordinary requires the clerk to ſubſcribe the other two articles mentioned in the 36th canon about the king's ſupremacy, and the lawfulneſs and uſe of the liturgy: the clerk muſt alſo, before inſtitution, ſubſcribe to that part of the declaration enjoined by the act of uniformity, 14 Car. II. c. 24, *viz.* "I will conform to the Liturgy of England, as by law eſtabliſhed." – Before inſtitution, he muſt alſo take the oaths mentioned in the firſt ſtatute of William and Mary, c. 8. inſtead of the former oaths of allegiance and ſupremacy, required by ſtat. 1 Eliz. and then he muſt take the oath againſt ſimony, enjoined by the 40th canon, and the oath of canonical obedience; and if it is a vicarage, the oath of perſonal reſidence; and he is to have certificates given him of his ſubſcribing the declaration contained in the act of uniformity, in Engliſh, in a diſtinct inſtrument, under the hand and ſeal of the biſhop; and of his other ſubſcriptions and oaths, in Latin.

The clerk ought by all means to have witneſſes of his inſtitution, his taking the oaths, making ſubſcriptions, &c. and therefore he ſhould make ſome preſent to write their names on the back of his inſtruments, and make memorandums who they are, and where they live.

The church, by inſtitution, is full againſt all perſons but the king, but it is not full againſt the king, till induction; and the clerk by it may enter upon the parſonage houſe and glebe, and take the tithes; but he cannot let or grant them, nor ſue for them, if they be refuſed to be paid till he be inducted.

After inſtitution, the clerk is to receive a written mandate from the ordinary to the archdeacon, or other proper perſon, in order to his induction; without which he has not a full right to his temporalities, unleſs the benefice be a donative. See INDUCTION.

INSTITUTION, *African*, a ſociety formed by the friends of the Abolition of the Slave-trade aſſembled on the 14th of April 1807, and eſtabliſhed on the ſubſequent 15th of July. The reſolutions adopted by the conſtituent meeting, as the baſis of the aſſociation, are as follow: 1. That this meeting is deeply impreſſed with a ſenſe of the enormous wrongs which the natives of Africa have ſuffered in their intercourſe with Europe; and from a deſire to repair thoſe wrongs, as well as from general feelings of benevolence, is anxious to adopt ſuch meaſures as are beſt calculated to promote their civilization and happineſs. 2. That the approaching ceſſation of the ſlave-trade, hitherto carried on by Great Britain, America, and Denmark, will, in a conſiderable degree,

gree, remove the barrier which has ſo long obſtructed the natural courſe of ſocial improvement in Africa; and that the way will thereby be opened for introducing the comforts and arts of a more civilized ſtate of ſociety. 3. That the happieſt effects may be reaſonably anticipated from diffuſing uſeful knowledge, and exciting induſtry among the inhabitants of Africa, and from obtaining and circulating throughout this country more ample and authentic information concerning the agricultural and commercial faculties of that vaſt continent; and that through the judicious proſecution of theſe benevolent endeavours, we may ultimately look forward to the eſtabliſhment, in the room of that traffic, by which Africa has been ſo long degraded, of a legitimate and far more extended commerce, beneficial alike to the natives of Africa, and to the manufacturers of Great Britain and Ireland. 4. That the preſent period is eminently fitted for proſecuting theſe benevolent deſigns; ſince the ſuſpenſion, during the war, of that large ſhare of the Slave-trade, which has commonly been carried on by France, Spain, and Holland, will, when combined with the effect of the Abolition laws of Great Britain, America, and Denmark, produce nearly the entire ceſſation of that traffic along a line of coaſt extending between two and three thouſand miles in length, and thereby afford a peculiarly favourable opportunity for giving a new direction to the induſtry and commerce of Africa. 5. That, for theſe purpoſes, a ſociety be immediately formed, to be called the "African Inſtitution." See the firſt report of the ſociety, which proceeds to obviate the difficulties which may appear to lie in the way of the attainment of theſe intereſting objects; and particularly to remove the moſt ſpecious objection to the deſign, *viz.* deſpair of its ſucceſs. The means by which this laudable aſſociation purpoſed to accompliſh its noble and captivating objects are as follow: Firſt of all, this inſtitution, wiſe by the example of the Sierra Leone company, diſclaims in the outſet all projects of a colonial or commercial nature. It embarraſſes itſelf with no concerns of government—no mercantile ſpeculations—no factories or forts—not even with the poſſeſſion of a ſingle ſhip, or an acre of ground. This clears the way for exertion, not only by removing every ſuſpicion of unworthy or doubtful motives, but by throwing off a thouſand clogs which muſt have hampered an eſtabliſhment of a different character. For obvious reaſons the ſociety alſo diſclaims all ſchemes of religious miſſion; and avowing, upon that important ſubject, not certainly any kind of indifference, but a wiſe and neceſſary neutrality, it leaves in other hands the taſk of propagating the goſpel among the Africans, and confines its own exertions to the introduction of that civilization, which is the beſt preparative for the truths of Chriſtianity. Not to mention other reaſons for this ſalutary caution, it has one moſt important and beneficial effect. It opens wide the doors of the inſtitution to all ſects and denominations of Chriſtians,—whom it thus invites to co-operate for purpoſes equally ſubſervient to every form of worſhip, and every modification of religious belief. The means which it is propoſed by this ſociety to employ for the purpoſe of promoting civilization and improvement in Africa, are of the following kind: "1. To collect and diffuſe throughout this country accurate information reſpecting the natural productions of Africa, and, in general, reſpecting the agricultural and commercial capacities of the African continent, and the intellectual, moral, and political condition of its inhabitants. 2. To promote the inſtruction of the Africans in letters and in uſeful knowledge, and to cultivate a friendly connection with the natives of that continent. 3. To endeavour to enlighten the minds of the Africans with reſpect to their true intereſts; and to diffuſe information amongſt them reſpecting the means whereby they may improve the preſent opportunity of ſubſtituting a beneficial commerce in place of the ſlave-trade. 4. To introduce amongſt them ſuch of the improvements and uſeful arts of Europe, as are ſuited to their condition. 5. To promote the cultivation of the African ſoil, not only by exciting and directing the induſtry of the natives, but by furniſhing, where it may appear advantageous to do ſo, uſeful ſeeds and plants, and implements of huſbandry. 6. To introduce amongſt the inhabitants beneficial medical diſcoveries. 7. To obtain a knowledge of the principal languages of Africa, and, as has already been found to be practicable, to reduce them to writing, with a view to facilitate the diffuſion of information among the natives of that country. 8. To employ ſuitable agents, and to eſtabliſh correſpondences, as ſhall appear adviſable; and to encourage and reward individual enterpriſe and exertion in promoting any of the purpoſes of the inſtitution."—Firſt Report. Beſides, the ſociety has adopted from the beginning, and ſince ſteadily purſued, the reſolution of watching over the ſtrict execution of the abolition laws—of procuring all information reſpecting the evaſion or breach of thoſe laws, which daring ſpeculators may attempt—of keeping the attention of the government alive, and quickening the exertions of the crown-officers on thoſe points—of ſuggeſting, from time to time, ſuch improvements in thoſe laws as a practical experience of their imperfections, or the change of circumſtances, may point out;—and, finally, of promoting, as far as poſſible, by communicating information, and other appropriate methods, the abolition of the African Slave-trade in foreign countries. This latter ſervice is quite eſſential to the improvement of Africa; and it is ſuch as a body, like the African inſtitution, is well adapted to perform. The preſident of the African Inſtitution is the duke of Glouceſter; and of the directors, who chiefly carried on its ordinary buſineſs along with this diſtinguiſhed prince, we ſhall only mention the names of Meſſrs. Wilberforce, Thornton, Vanſittart, W. Smith, Brougham, Clarkſon, G. Sharp, Allen, Stephen, and Macaulay, who, much to the advantage of the ſociety, undertook the laborious and difficult office of ſecretary, until it could be filled by a permanent arrangement. A reſpectable ſubſcription of about 3000*l.* was immediately raiſed. At the end of 1808, this had increaſed to 4374*l.*, of which 531*l.* aroſe from annual ſubſcriptions. Since that time the funds have been augmented by many donations, and the liſt of annual contributors ſoon increaſed. For a further account of this inſtitution, we refer to its annual reports, and to the Edinburgh Review, No. 30.

INSTITUTIONS, in *Literary Matters*, denote a ſyſtem of the elements, or rules, of any art or ſcience. Such are inſtitutions of medicine, inſtitutions of rhetoric, &c.

INSTITUTORES, in *Botany*, that ſet of authors in this ſcience who have laid down certain ſettled rules, axioms, and inſtitutions in it.

INSTRUCTIVE COLUMN. See COLUMN.

INSTRUMENT denotes a thing which is ſubſervient to a cauſe for producing its effect.

A common caſe of mathematical inſtruments contains ſeveral compaſſes, a ſector, ſcale, drawing-pen, and protractor. A caſe of ſurgeon's inſtruments for the pocket contains different ſized lancets, ſciſſors of ſeveral kinds, plain and toothed forceps, ſtraight and crooked inciſion-knives, a ſpatula, probes, needles, &c. Aſtronomical inſtruments, are the teleſcope, quadrant, &c. Chemical inſtruments, ſee LABORATORY. For the method of dividing mathematical and aſtronomical inſtruments, ſee ENGINE and GRADUATION.

INSTRUMENTS *of Sacrifice*, in the *Antique Architecture*, are ornaments, as vaſes, pateræ, candleſticks, knives, &c. wherewith the victims were killed, &c. inſtances of which we ſee in a Corinthian frieze in the remains of a temple behind the Capitol at Rome, &c.

INSTRUMENT is alſo uſed, in *Law*, to ſignify ſome public act, or authentic deed, by means whereof any truth is made apparent, or any right or title eſtabliſhed, in a court of juſtice.

INSTRUMENT, primarily denoting writing, charter, or record, is ſometimes uſed by Latin writers for the Old and New Teſtament. It occurs ſeveral times in Tertullian, reckoned the moſt ancient Latin writer of the church now remaining. He calls the Goſpels, or the New Teſtament in general, the Evangelic Inſtrument, and ſays, "how large chaſms Marcion has made in the epiſtle to the Romans, by leaving out what he pleaſes, may appear from one entire Inſtrument," or one unaltered copy of the New Teſtament, particularly of that epiſtle. Speaking of the ſhepherd of Hermas, he ſays, it was not reckoned a part of the Divine Inſtrument; thereby meaning, as it ſeems, the New Teſtament. He calls the law and the prophets the Jewiſh inſtruments, that is, writings or ſcriptures. He ſpeaks of the antiquity of the Jewiſh inſtruments, or ſcriptures. He ſeems in one place (Apol. cap. 18.) to uſe the word inſtrument as equivalent to ſcriptures, containing the doctrine of revelation, or the revealed will of God. Lardner.

INSTRUMENT, in *Muſic*, is a generical term, under which all artificial bodies, capable of producing and varying muſical ſounds in imitation of the voice, are comprehended. Every body capable of agitating the air by ſome ſhock, and exciting by its vibrations in this agitated ſtate undulations ſufficiently frequent, may produce ſound; and all bodies capable of accelerating or retarding theſe undulations may vary their ſounds. See SOUNDS.

There are three ways of producing ſound by inſtruments: by the vibration of ſtrings, by the vibration of elaſtic bodies, and by the colliſion of air incloſed in pipes. The invention of theſe inſtruments will be conſidered at the word MUSIC.

Inſtruments are generally claſſed under the three following heads; ſtringed-inſtruments, wind-inſtruments, and inſtruments of percuſſion. The ſtringed-inſtruments of the ancients were very numerous. Thoſe moſt known were the following: the lyra, pſalterium, trigonum, ſambuca, cithera, pectis, magadis, barbiton, teſtudo, epigonium, ſimmicum, epandoron, &c. All theſe inſtruments were touched with the fingers or played with a plectrum.

Their principal wind-inſtruments were the tibia, fiſtula, tuba, cornu, lituus, hydraulicon, &c.

Their inſtruments of percuſſion were the tympanum, cymbalum, crepitaculum, tintinnabulum, crotalum, &c; but many of theſe are monotonous, and only render one ſound.

Of moſt of theſe ancient inſtruments repreſentations on plates have been given (Hiſt. Muſ. vol. i.) from drawings made at Rome under our own eye, and under the guidance of Piraneſi, and Meſſrs. Jenkins, Morriſon and Byers, the beſt antiquaries at Rome in 1770; with a deſcription and authorities for their local ſituation at the time.

The beſt books on the ſubject of ancient muſical inſtruments, and the moſt worthy of being conſulted, are Blanchini de Tribus Generibus Inſtrumentorum Veterum Organica; Gabinetto Armonica, del Bonanni; Bartolinus de Tibiis Veterum; and Eſſais ſur la Muſique par M. Laborde; who has given repreſentations very neatly engraved of the muſical inſtruments during the middle and lower ages, from illuminations in ancient MSS. of the Bibl. Royale at Paris in 1780; which, if the wiſh to render their delineation pictureſque had not a little injured their fidelity, would be invaluable.

INSTRUMENTS, *Muſical*, of the Abyſſinians, from Mr. Bruce, the authenticity of whoſe account ſeems to be no longer doubted, we ſhall give from his letter inſerted in Burney's General Hiſtory of Muſic, vol. i.

"There are ſix muſical inſtruments known in Abyſſinia; the flute, the trumpet, the kettle-drum, the tambourine, the ſiſtrum, and the lyre.

"The four firſt are uſed in war, and are by much the moſt common; the fifth is dedicated to the ſervice of the church; and the ſixth is peculiarly an attendant on feſtivity and rejoicings.

"There are two principal languages in Abyſſinia, the Æthiopic, which is the literal, or dead language; and the Amharic, or language of Amhara, ſpoken by the court.

"The flute, in the Æthiopic, is called *Kwetz*, a word difficult to be written or ſounded in Engliſh; in the Amharic, it is called Agădă: it is about the ſhape and ſize of the German flute, but played upon long-ways, with a mouth-piece reſembling that of the clarinet; its tone is not loud, but accompanied with a kind of jar, like a broken hautbois; not owing to any accidental defect, but to conſtruction and deſign, as it would not be eſteemed without it.

"The kettle-drum is called in both languages *Nagareet*, becauſe all proclamations are made by the ſound of this drum (theſe are called Năgăr), if made by governors, they have the force of laws in their provinces; but if made by the king, they are for all Abyſſinia. The kettle-drum is a mark of ſovereign power: whenever the king promotes a ſubject to be governor, or his lieutenant-general in a province, he gives him a kettle-drum, and ſtandard as his inveſtiture. The king has forty-five of theſe drums always beating before him when he marches. They are in ſhape and ſize like our's, only they are braced very diſadvantageouſly; for the ſkin is ſtrained over the outer rim, or lip of the drum, and brought a third down its outſide, which deadens it exceedingly, and deprives it of that clear, metallic ſound which our's has. Each man has but a ſingle drum, upon the left ſide of his mule, and beats it with a crooked ſtick, about three feet long. Upon the whole, its ſound is not diſagreeable, and I have heard it at an incredible diſtance.

"The third inſtrument is the ſmall drum, called Kăbăro, in Æthiopic and Amharic; though in ſome parts of Amhara it is alſo called Hătămo. It is about half the diameter, and twice the length of our common drum; it is juſt the tambourine of Provence, only rounded to a point at the lower end. This is beaten always with the hand, and carried ſometimes on foot, ſometimes on horſeback, when any inferior officer (not having a Nagareet) marches.

"The trumpet is called Mĕlĕkēta, or Mĕlĕket; and *Kenet* in Amharic, but *Keren* in Æthiopic (or horn); which ſhews of what materials it was anciently formed. It is now made of a cane that has leſs than half an inch aperture, and about five feet four inches in length. To this long ſtalk is fixed at the end a round piece of the neck of a gourd, which has juſt the form of the round end of our trumpet, and is on the outſide ornamented with ſmall white ſhells; it is all covered over with parchment, and is a very neat inſtrument. This trumpet ſounds only one note, E, in a loud, hoarſe, and terrible tone. It is played ſlow when on a march, or before an enemy appears in ſight; but afterwards it is repeated very quick, and with great violence, and has the effect upon the Abyſſinian ſoldiers of tranſporting them abſolutely to fury and madneſs, and of making them ſo regardleſs of life, as to throw themſelves in the middle of the enemy, which they do with great gallantry. I have often in time of peace tried what effect this charge would have upon them, and found that none who heard it could continue ſeated, but that all roſe up and continued the whole time in motion.

"The fifth inſtrument is the ſiſtrum: it is uſed in the quick meaſure, or in allegros, in ſinging pſalms of thankſgiving. Each prieſt has a ſiſtrum which he ſhakes in a very threatening manner at his neighbour, dancing, leaping, and turning round with ſuch an indecent violence, that he reſembles rather a prieſt of paganiſm, whence this inſtrument was derived, than a Chriſtian. I have forgot the name of the ſiſtrum in Ethiopic, but on looking into my notes I ſhall find it.

"The ſixth and laſt inſtrument is the lyre, which is never played ſolo, but always in accompanying the voice, with which it plays conſtantly in uniſon; nor did I ever hear *muſic in parts*, in any nation, ſavage or poliſhed, out of Europe: this is the laſt refinement muſic received, after it was in poſſeſſion of complete inſtruments, and it received it probably in Italy.

"The lyre has ſometimes five, ſometimes ſix, but moſt frequently ſeven ſtrings, made of the thongs of raw ſheep or goat ſkins, cut extremely fine, and twiſted; they rot ſoon, are very ſubject to break in dry weather, and have ſcarce any ſound in wet. From the idea, however, of this inſtrument being to accompany and ſuſtain a voice, one would think that it was better mounted formerly.

"The Abyſſinians have a tradition, that the ſiſtrum, lyre, and tambourine were brought from Egypt into Æthiopia, by Thot, in the very firſt ages of the world. The flute, kettle-drum, and trumpet, they ſay, were brought from Paleſtine with Menelek, the ſon of their queen of Saba, by Solomon, who was their firſt Jewiſh king.

"The lyre in Amharic is called bĕg (the ſheep); in Ethiopic, it is called mĕsīnkō; the verb *ſinko* ſignifies to ſtrike ſtrings with the fingers: no *plectrum* is ever uſed in Abyſſinia, ſo that *meſinko* being literally interpreted, will ſignify "the ſtringed inſtrument played upon with the fingers." This would ſeem as if anciently there was no other ſtringed inſtrument in Abyſſinia, nor is there any other ſtill." See THEBAN HARP, with Mr. Bruce's drawing and account of it, in the ſame volume.

Modern muſical inſtruments will be deſcribed under their ſeveral heads as they occur.

In modern times, ſince harmony has ſuſtained ſo important a part in muſic, muſical inſtruments have been divided into *perfect* and *imperfect*, the firſt of theſe being ſuch as are capable of executing or ſounding as many notes of different pitches within a given compaſs, as within an octave for inſtance, as the harmony of the muſic performed upon it may require, without being forced to introduce notes, which make falſe or tempered intervals, or *wolves* with the other notes of the piece, ſounded at the ſame time; as in the ſecond claſs neceſſarily happens, in very numerous inſtances, where the notes are previouſly fixed and tuned, as it is called, to ſome certain ſcale or ſyſtem of 12 notes within the octave, and which notes the performer of any one part in a piece of muſic has not the power of altering and adjuſting to the true harmonic relation with the ſimultaneous notes of the baſs, or other principal part: imperfect inſtruments are not, however, confined to thoſe with 12 ſtrings, pipes, &c. in an octave, but the term applies, though in a leſs degree, to inſtruments with 14, 16, or 17 ſtrings, as ſhewn in our article HAWKE'S *temperament* of the muſical ſcale, where his 17 notes in the octave are proved to be incapable of baniſhing wolves, or falſe intervals, even from tempered ſyſtems, and which Dr. Smith's harpſichords with 21 notes in the octave were alike unable to effect, in the numerous paſſages of modern muſic where double ſharps or double flats occur: but on the improved organs and piano fortes of D. Loeſchman, whoſe ſcale is extended to 24 notes, all ſuch notes as uſually occur can be truly given, according to any aſſigned ſyſtem of temperament. The violin, viola, baſs-viol or violoncello, and double baſs, have held a diſtinguiſhed rank in modern refined concerts as perfect inſtruments, and were, indeed, the only inſtruments that ſhould be admitted to accompany the human voice, which exceeds, in the perfection of its ſcale, any inſtrument whatever, ſince a vocal performer, with a good ear and intonation, can inſtantly ſtrike a perfect interval to any note whatever, without the leaſt beating or degree of temperament or imperfection in the harmony, and this he does, by attempering the leaps or intervals of the melody (ſee MELODY, *Temperaments of*): it being abſolutely and demonſtrably impoſſible to avoid temperaments, or the uſe of imperfect intervals, either in the harmony or in the melody, (but they need not be uſed in both,) on perfect inſtruments, as on imperfect inſtruments they neceſſarily muſt, as is ſhewn in our article HARMONY, *Temperaments of*: the late Mr. Maxwell, in the year 1781, in his "Eſſay on Tune," ſketched out the principles of an organ capable, by means of 44 pipes in each octave, of entirely baniſhing temperaments from the harmony, in 24 keys, 12 major and 12 minor: but we never heard until very lately, that any one had conſtructed ſuch an inſtrument. It appears, however, that on the 3d of July 1810 the Rev. Henry Liſton took out a patent for his *enharmonic organ*, and in the autumn of the year iſſued propoſals for publiſhing, by ſubſcription, "An Eſſay on perfect Intonation," and for exhibiting one of theſe patent organs in London, which had been completed in Scotland, and tuned, ſays his proſpectus, "perfectly true throughout, *without any temperament whatever*, and performs every chord, in every key *abſolutely perfect*, nor is there any combination which it is not capable of performing."—"The decided ſuperiority of the harmony has been acknowledged by the beſt judges, and the performers have found no ſerious difficulty in the moſt ſudden and extraneous modulation, or in the wideſt range of keys:" ſuch were the pretenſions of this inſtrument, and which no muſical perſons that we converſed or correſponded with ſeemed diſpoſed to expect would be realiſed: however, in the beginning of this month (April 1811), Mr. Liſton arrived in London with his organ, and had it put up at Flight and Robſon's, organ builders in St. Martin's lane, and tuned it, and on the 16th politely gave us the opportunity to be the firſt that heard it performed on in London, and of hearing the effect of ſome glees ſung to it; which proved delightful indeed, and rather exceeded our expectations than otherwiſe, though they had, as above hinted, been raiſed above thoſe of moſt muſical perſons. The Rev. Mr. Liſton alſo favoured us with the peruſal of the manuſcript of the firſt part of his intended work, in which we were delighted to obſerve, that a good knowledge and a correct application of mathematics is combined with a thorough knowledge of compoſition, and of the wants of the practical muſician; the defect of one of which eſſential qualifications we have ſo often had to deplore, and even to reprobate, in our numerous quotations and references to modern writings on temperament, and on the nature and magnitude of muſical intervals, in the different articles of our work. Mr. Liſton's work will deſcribe an inſtrument with 24 pipes in each octave, and to each of which two valves or ſhaders, of different ſizes, are adapted, affixed to radii from rolls or axles, that can be turned by means of pedals, ſo that each of theſe pipes can be made to ſound one major comma or two major commas flatter than the pitch of the pipe, making in all 72 ſounds in each octave, which, by the 12 uſual finger keys and the uſe of twelve pedals, enables the performer to give 33 perfect keys, without any tempered harmonies. The inſtrument, ſhewn as above, has not ♭ F, but contains 20 pipes, and gives 60 different ſounds within the octave. See the Philoſophical Magazine, vol. xxxvii. p. 273, and our article Liston's *Scales of Muſical Intervals*.

Instrument, *Wind*. See Wind.

INSTRUMENTAL Arithmetic. See Arithmetic.

Instrumental *Cauſe*. See Cause.

INSTRUMENTUM Synodale. See Synodale.

INSUFFLATIO, a term uſed by ſome writers in medicine, to expreſs the blowing into any part, in order to convey the fumes of medicine into it.

INSULATE, or Insulated, a term applied to a column or other edifice, which ſtands alone, or free and detached from any contiguous wall, &c. like an iſland in the ſea; whence the denomination is apparently derived.

Insulated, in *Electricity*, is a term applied to bodies that are ſupported by electrics or non-conductors; ſo that their communication with the earth, by conducting ſubſtances, is interrupted.

INSULT, in *Law*. See Assault.

Insult, a military term uſed for the attack of any poſt with open force: without the apparatus of trenches, ſaps, or any regular approaches. See Assault.

INSULTUS, a word uſed by the writers in medicine to ſignify the acceſs of the paroxyſm in intermittent diſeaſes, or ſometimes the firſt invaſion of a diſeaſe.

INSUMA, in *Geography*, a town of Arabia, in the province of Hedsjas; 10 miles S.W. of Mecca.

INSUPER, a word uſed by the auditors of the Exchequer. In their accompts they ſay, ſo much remains *inſuper* to ſuch an accomptant; that is, ſo much remains due on his accompt.

INSURANCE, or Assurance, in *Law* and *Commerce*, a contract or agreement whereby one party, in conſideration of a ſtipulated ſum, undertakes to indemnify the other, againſt certain perils or riſks to which he is expoſed, or againſt the happening of ſome event. The party, who takes upon himſelf the riſk, is called the "Inſurer," ſometimes the "Underwriter," from his ſubſcribing his name at the foot of the policy; the party protected by the inſurance is called the "inſured;" the ſum paid to the inſurer, as the price of the riſk, is called the "premium;" and the written inſtrument, in which the contract is ſet forth and reduced to form, is called a "policy of inſurance, or aſſurance." See Policy.

The riſks againſt which inſurances are made are infinitely various, and many frauds have been practiſed on the ignorant and credulous, under pretence of inſurance, which the legiſlature has found it neceſſary, from time to time, to repreſs. In the reign of queen Anne, ſeveral offices were opened for making inſurances on marriages, births, chriſtenings, ſervice, &c., and fraudulent practices prevailed to ſuch a degree, that by ſtat. 9 Ann. c. 6. § 37, a penalty of 500*l*. is impoſed on every perſon ſetting up ſuch office, and 100*l*. on every perſon making ſuch aſſurances in any office already ſet up. Fraudulent inſurances have alſo occurred among dealers in lottery tickets, the ſhares and the chances of them, which, beſides the reſtraints to which they are ſubject in the annual lottery acts, have occaſioned the ſtat. 27 Geo. III. c. 1, made expreſsly with a view to this evil, and by which they have been conſiderably diminiſhed. See Lottery.

Inſurances of the greateſt public utility are, "Marine Inſurances," including bottomry and reſpondentia, which are a ſpecies of marine inſurance (ſee each of theſe articles);—"Inſurance upon Lives" (ſee Assurance); and "Inſurances againſt Loſſes by Fire."

Insurances, *Marine*, are made for the protection of perſons having an intereſt in ſhips, or goods on board, from the loſs or damage that may happen to them from the perils of the ſea, during a certain voyage, or a fixed period of time. By "peril" is here meant, not danger or hazard, according to the common acceptation of the term; but it ſignifies the "happening" of the event or misfortune of which danger was apprehended. The utility of this contract conſiſts in the protection it affords to maritime commerce, by dividing loſſes, when they happen, between many, ſo as to make them fall leſs heavily on individuals, who are thus enabled to embark their whole capitals in hazardous enterpriſes. (See the preamble to the ſtat. 43 Eliz. c. 12.) As the Turks are unacquainted with inſurance, they require for the loan of money 15 or 20 *per cent.*; and when they lend money to merchants who trade by ſea, they charge 30 *per cent.* Some have aſcribed the invention of inſurance to the ancient Romans. Accordingly Puffendorf, Barbeyrac, Loccenius, Kulpis, and others, refer to a paſſage in Livy (l. xxiii. c 44.), who ſays, that when the Roman army in Spain was diſtreſſed for proviſions, cloathing, and other neceſſaries, a company engaged to convey to them every thing of which they ſtood in need, under this ſtipulation, that the ſtate ſhould make good their loſs, in caſe their veſſels ſhould be ſhipwrecked by ſtorms, or taken by the enemy. This was undoubtedly a promiſe of indemnification, but by no means an inſurance, in which it is always neceſſary to give a premium. Kulpis, Anderſon, Malyne, and others, rely on the authority of Suetonius (l. v. c. 18.) who tells us, that the emperor Claudius promiſed to indemnify merchants for their loſſes, if their ſhips ſhould periſh by ſtorms at ſea; but neither this paſſage nor another that has been referred to in Valerius Maximus (l. vi. c. 5.), contains any thing that can be applied to inſurance in the modern ſenſe of the term. A paſſage has alſo been quoted by Grotius from Cicero's epiſtles (Epiſt. ad Fam. ii. ep. 7.), as a proof that the Romans were acquainted with this contract. But Cicero's words, juſtly interpreted, ſeem to bear a much ſtronger alluſion to the practice of remitting money by means of bills of exchange, than to that of inſuring againſt the perils of the ſea. In the Pandects we have an obſervation of Ulpian, which affords greater reaſon for ſuppoſing that the contract of inſurance was not altogether unknown to the Romans, than any of the paſſages already cited. He ſays (Dig. l. xlv. de verb. oblig.), "Illa ſtipulatio, decem millia ſalva fore promittis? valet." This paſſage, however, ſhews, as ſerjeant Marſhall has obſerved, that the contract alluded to, whatever it might have been, was very little known at the time when Ulpian wrote, ſince he thought it neceſſary to remark, that "it was not illegal." Malyne, Anderſon, &c. affirm, that inſurance is mentioned in the marine laws of the iſle of Oleron, on the coaſt of France, which was much celebrated in the 11th, 12th, and following centuries, on account of its trade. But in theſe laws there is no trace of inſurance, as the learned editor, Cleirac, acknowledges. The celebrated maritime laws of the city of Wiſby, in the iſland of Gothland, are equally ſilent with regard to inſurance. Inſurance was, undoubtedly, not known in 1597, when the ordinances of the Hanſeatic league were framed, nor in 1614, when ſeveral new regulations were added; becauſe, though the contract of bottomry is mentioned in theſe regulations, there is not a word on the ſubject of inſurance, nor does any thing certain occur in the collection of maritime laws, intitled "Il Conſolato del Mare," written in the Catalonian dialect, partly framed in the 11th, but for the moſt part in the 13th century, and publiſhed at Leyden in 1704. (See *Marine* LAW.) Some have ſaid, without ſufficient authority, that the practice of inſurance was introduced by the Jews in 1182; and others have ſought its origin about the year 1560, in the great woollen commerce that ſubſiſted between England and the Netherlands. But as the maritime commerce of the Italian ſtates appears to have been carried on to a very conſiderable extent about the end of the 13th century, it is very probable that inſurance came into uſe in Italy about that time. From thence it was tranſplanted into all the countries where the Lombards had eſtabliſhed their trading companies. One of theſe companies ſettled in London, and from them Lombard-ſtreet in that capital took its name. According to Malyne inſurance was introduced into England by the Lombards ſomewhat earlier than into the neighbouring countries on the continent; and in proof of this, he ſays, that even Antwerp, in its meridian glory, borrowed inſurance from England; and that, down to the time in which he wrote (1622), there was, in every policy made at Antwerp, and other places in the Low Countries, a clauſe inſerted, that it ſhould be in all things the ſame as policies made in Lombard-ſtreet, in the city of London; the place where the Lombards are known to have firſt ſettled, and carried on their commerce in England, and where the merchants of London uſed to hold their meetings before the Royal Exchange was built. Anderſon (Hiſt. of Commerce) ſays, that the vaſt commerce carried on about the middle of the 16th century, between England and the Netherlands, introduced the practice of inſuring from loſſes by ſea, by a joint contribution. But the preamble to the ſtatute 43 Eliz. c. 12, already cited, which ſtatute was paſſed in 1601, diſtinctly ſtates, that it had been an "immemorial uſage" among merchants, both Engliſh and foreign, when they made any great adventure, to procure inſurance to be made on their ſhips or goods adventured. From this it may be reaſonably ſuppoſed, that inſurance muſt have been in uſe in England long before the middle of the preceding century. The law of inſurance, ſays Mr. Marſhall (ubi infra), is conſidered as a branch of marine law; and it is alſo a branch of the law of merchants (ſee LAW); and it may be collected from theſe two ſources in the ordinances of different commercial ſtates, in the treatiſes of learned authors on the ſubject of inſurance, and in judicial deciſions of this country, and alſo of others profeſſing to follow the general marine law and the law of merchants. The earlieſt ordinance now extant on the ſubject of inſurances is that of Barcelona, ſuppoſed to have been publiſhed about the year 1435. The next ordinance on this ſubject was publiſhed at Florence in the beginning of the year 1523. The emperor Charles V. in 1551 publiſhed ſeveral regulations concerning maritime commerce, called the "Caroline" code, to which his ſon Philip II. added a number of new ordinances in 1563 and 1565. Magens, in his "Treatiſe on Inſurance, Average, and Bottomry," publiſhed at Hamburgh in 1753, has collected many of theſe ordinances; but the moſt complete ſyſtem of poſitive law for the regulation of inſurances, that has yet appeared in any country, may be found in the celebrated ordinance of the marine of Louis XIV., publiſhed in 1681. The ſtatutes pertaining to this ſubject, which have been enacted in England, have not been numerous; and, therefore, the practice among us has been found moſt conformable to the general uſage of trade. As to treatiſes on inſurance, the earlieſt now extant is that entitled "Le Guidon de la Mer," which is found in the collection of marine inſtitutions, publiſhed at Rouen in 1671 by Cleirac, under the title of "Les Us et Coûtumes de la Mer." This is ſuppoſed to have been written about the 15th century. In France, Valin, Pothier, and Emerigon, have written on this ſubject. The treatiſe of the latter is, in the judgment of ſerjeant Marſhall, the moſt uſeful to an Engliſh lawyer of all the foreign publications on this ſubject. Roccus, Caſaregis, Locennius, Bynkerſhoek, and Santerna, have alſo publiſhed treatiſes on this ſubject. We have alſo in England detached obſervations on inſurance in the treatiſes of Malyne, Molloy, Beawes, Poſtlethwaite, and ſome others of leſs note. Mr. Magens, a merchant, in 1735, republiſhed in two volumes 4to. his "Eſſay on Inſurance," which he had before publiſhed in German at Hamburgh. Mr. Millar, a learned advocate at the Scots bar, publiſhed at Edinburgh, in 1787, the "Elements of the Law relating to Inſurances;" Mr. Park has alſo given to the world his excellent "Syſtem of the Law of Inſurances;" and in 1802 the public was favoured by Samuel Marſhall, ſerjeant at law, with his "Treatiſe on the Law of Aſſurance," in 4 books, containing an ample account of every thing that is eſſentially neceſſary to be known on this ſubject. As to judicial deciſions, none of theſe are conſidered as binding authorities in our ſuperior courts, except ſuch as have been there determined; and even theſe may be re-conſidered and over-ruled. Before the paſſing of the act of queen Elizabeth, above cited, almoſt all diſputes, ariſing upon contracts of inſurance, were ſettled by arbitration, and without recurring to any legal proceedings. And there ſeems to have been a particular tribunal for ſuch arbitrations, eſtabliſhed in London, compoſed of perſons annually appointed by the lord mayor. From Malyne we learn that there was an "office of aſſurances," on the weſt ſide of the Royal Exchange, where inſurances were made; and to this office belonged certain commiſſioners, who were annually appointed. The authority of theſe commiſſioners was confirmed by act of parliament, in the latter period of the reign of queen Elizabeth. (See COURT *of Policies of Aſſurance.*) This court gradually ſunk into diſrepute, and all ſuits on policies of inſurance were preferred in the courts of common law. After ſome of the deciſions of the courts of Weſtminſter, on queſtions of inſurance, came to be generally known, the confidence which the juſtice, impartiality, and ability of thoſe courts inſpired through Europe, ſoon induced the merchants of all countries to prefer Engliſh inſurances to thoſe of any other country.

The parties to the contract of inſurance are the inſured and the inſurers. In this country, all perſons, whether Britiſh ſubjects or aliens, may, in general, be inſured. The principal, if not the only exception to this rule, is the caſe of an alien enemy. The inſurance of the ſhips and merchandize of France, during a war with that country, is prohibited by 21 Geo. II. c. 4; and by 33 Geo. III. c. 27. § 4, which latter ſtatute not only declares ſuch inſurances to be void, but alſo ſubjects the parties concerned in them to three months' impriſonment. The policy of this prohibition was however diſputed in 1741, by ſir John Barnard, and in 1748 by ſir Dudley Rider and Mr. Murray, then attorney and ſolicitor-general. But their objections were over-ruled. Nevertheleſs, it appears that a neutral, though reſiding in the enemy's country, and carrying on trade there, and even in partnerſhip with an alien enemy, may inſure his intereſt in the joint property.

Thoſe who are inſurers, or underwriters, ſhould be perſons of great prudence and circumſpection; and caſes may occur, which will require more than ordinary ſagacity, penetration, and experience. At common law, any man, or company of men, might be inſurers; and individuals, upon their own ſeparate account, have ſtill the ſame right. But about the beginning of the laſt century it was thought expedient, partly with a view of counteracting the evil ariſing from inſurance by inſufficient perſons, and perhaps, principally for enabling government to raiſe a ſum of money by the ſale of a monopoly, to erect two companies for making marine inſurances, with ſuch funds to anſwer all demands on their policies as might give confidence to mercantile adventurers, who were unwilling to depend on individual underwriters; ſtill, however, leaving to merchants the option of inſuring with ſuch underwriters whom they thought proper. To this end the ſtat. 6 Geo. I. c. 18, authorized the king to grant charters to two diſtinct companies or corporations, for the inſurance of ſhips, goods, and merchandize, at ſea, or going to ſea, and for lending money on bottomry. In purſuance of the powers given by this act, the two propoſed companies, the one called the "Royal Exchange Aſſurance," and the other the "London Aſſurance," were eſtabliſhed by royal charter, bearing date June 22, 1720. The moſt important privilege granted to theſe companies was the excluſive right of making marine inſurances, and lending money on bottomry, as a "Company" or "Partnerſhip," on a "joint capital."

Inſurance is ſaid to be "a contract of indemnity from loſs or damage, ariſing upon an uncertain event." So that the object of inſurance is to avoid a poſſible loſs. Hence it appears, that there cannot be an indemnity without a loſs, nor a loſs without an intereſt. A policy, therefore, without intereſt, is not an inſurance, but a mere wager. It is not eaſy to define and aſcertain inſurable intereſt. The intereſts of commerce, and the various rights which different perſons may have in the ſame thing, require that not only thoſe who have an "abſolute" property in ſhips and goods, but thoſe, alſo, who have a "qualified" property in them, may be at liberty to inſure them; and this principle has been ſo extended, that if a merchant abroad, in order to ſecure the payment of a debt due to his correſpondent in England, mortgage to him his intereſt in certain goods and freight; the correſpondent, after the mortgage becomes abſolute, may inſure the "legal" intereſt on his own account, or the "equitable" intereſt on account of the mortgagor. A reaſonable expectation of "profit," or a well-founded expectation of a future intereſt in the thing inſured, is an inſurable intereſt. But a mere hope or expectation of future gain, however well founded, is not an inſurable intereſt, unleſs accompanied by poſſeſſion of the ſubject-matter of the inſurance. Of this nature is the intereſt which the captor acquires in a prize regularly taken in war. It alſo appears, that perſons in the character of "truſtees," for the diſpoſal of ſhips and goods according to ſuch inſtructions as they might receive from third perſons, may inſure ſuch ſhips and goods for the benefit of the perſons who may eventually be entitled to the produce of them. Accordingly, commiſſioners, entitled "The Honourable Commiſſioners for the Sale of Dutch Property," were appointed by 35 Geo. III. c. 80. § 21. to take into their care all Dutch ſhips, &c. detained in Britiſh ports, and to diſpoſe of them in purſuance of directions from the privy council; and they were authorized to inſure, in their own names, ſuch ſhips, after ſeizure at ſea, and while they were on their paſſage to England. At common law, an inſurance might have been made without intereſt; nor is it neceſſary to aver intereſt in any caſe not prohibited by 19 Geo. II. c. 37. An inſurable intereſt can only be founded on a legal or equitable title; but a mere claim, which the law cannot admit to be either legal or equitable, is not an inſurable intereſt. As freight can only be due to the legal owner of a ſhip, he only can inſure it; and no perſon can have either a legal or equitable title to a ſhip, unleſs he be named in the regiſter. Although "reſpondentia" and "bottomry" are of themſelves a ſpecies of inſurance, yet the lender has an inſurable intereſt in his ſecurities, and therefore may protect himſelf from the ſea-riſk by inſuring them. However, a policy on bottomry or reſpondentia cannot be ſubſcribed by the borrower of the money; for if he were to become an inſurer, this would be no longer a loan upon bottomry, but a cloak for uſury. See *Wager* POLICY, and the ſequel of this article.

Inſurances are of various kinds, as on ſhips or parts of ſhips, on merchandize ſingly, and on ſhips and goods jointly, on freight, and bottomry loans; and theſe are again branched out to run either for a time ſtipulated, or to one ſingle port, or out and home, with liberty to touch at the different places mentioned in the policy.

It is laid down as a general rule, that no inſurance can be legally made upon any voyage undertaken contrary to the laws of this kingdom, or to thoſe of its dependencies, or to the law of nations. Nor is it of any importance whether the inſurer was or was not informed that the voyage was illegal. Conſequently, an inſurance upon a voyage undertaken contrary to the navigation laws would be void. The caſe is the ſame with regard to a voyage prohibited by the laws made for the protection of the monopoly of the Eaſt India company. Under the treaty allowing the Americans to trade to the Britiſh colonies in India, concluded in 1795 and confirmed by 37 Geo. III. c. 97, it is not neceſſary that this trade ſhould be carried on from America to the Britiſh ſettlements in the Eaſt Indies "direct;" but it may be carried on "circuitouſly" by the way of Europe. With reſpect to the riſks or perils againſt which inſurances are uſually made, they are expreſſed in the words of the policy, which are as follow: "Touching the adventures and perils which we the aſſurers are contented to bear, and do take upon us in this voyage, they are of the ſeas, men of war, fire, enemies, pirates, rovers, thieves, jettiſons, letters of mart and countermart, ſurpriſals, takings at ſea, arreſts, reſtraints and detainments of all kings, princes, and people, of what nation, condition, or quality whatſoever: barratry of the maſter and mariners; and of all other perils, loſſes, and misfortunes, that have or ſhall come to the hurt, detriment, or damage of the ſaid goods and merchandize, and ſhip, &c., or any part thereof, without prejudice to this inſurance." But by the agreement of the parties, the general words of the policy may be altered or qualified, and any of the riſks may be wholly or in part excluded: and the inſurance may be made only againſt ſome particular riſks, or up to, or beyond certain degrees, or upon particular articles. In the policies of moſt countries it is ſtipulated that the inſurer ſhall not be liable for any partial loſs under a given rate *per cent*. A clauſe to this purpoſe, which was firſt introduced in 1749, is inſerted at the bottom of all Engliſh policies. Nevertheleſs, the inſurer is liable for loſſes, however ſmall, called "general average," and loſſes occaſioned by the "ſtranding of the ſhip." In the policies of private underwriters the memorandum is as follows: "corn, (comprehending every ſort of grain, and alſo peaſe and beans,) fiſh, ſalt (not including ſalt-petre), fruit, flour and ſeed, are warranted free from average, unleſs general (denoting loſſes ariſing from any cauſe affecting the general ſafety of the ſhip and cargo), or the ſhip be ſtranded: ſugar, tobacco, hemp, flax, hides and ſkins are warranted free from average, under 5 *per cent.*, and all other goods, alſo the ſhip and freight, are warranted free from average, under 3 *per cent.* unleſs general, or the ſhip be ſtranded." In 1754 the two companies, *viz.* thoſe of the *London* and *Royal Exchange* aſſurance left out the words, "or the ſhip be ſtranded;" but private underwriters have continued them. If any loſs or damage happen to the goods, from any fault or defect of the ſhip, the owner has his remedy againſt the proprietors of the ſhip, and the inſurer is not liable; becauſe, in every contract of inſurance, there is an implied warranty, that the ſhip is ſea-worthy: if otherwiſe, the contract is void. In many caſes the maſter alſo is liable. The marine law, with which agrees the common law of England, conſiders the owners, as well as the maſter, as common carriers, and anſwerable for all loſſes, except ſuch as ariſe from the act of God, the king's enemies, or the perils of the ſea. In order to charge the inſurer, the loſs muſt happen in the courſe of the voyage, and during the continuance of the riſk. In our policies the words uſually employed to expreſs the commencement and end of the riſks on goods are theſe: "Beginning the adventure upon the ſaid goods and merchandize *from the loading thereof aboard the ſaid ſhip*, and ſo ſhall continue and endure until the ſaid ſhip with the ſaid goods ſhall be arrived at ——— (her port of delivery), and until the ſame be diſcharged and ſafely landed." This rule, however, admits of ſome exceptions, which our limits will not allow us to enumerate. The duration of the riſk on the ſhip varies with us in almoſt every caſe. In outward-bound voyages it is generally made to commence from her beginning to load at her port of departure. Ships engaged in the coaſting-trade, or in ſhort voyages, are inſured for a limited period of time; and in ſuch caſes, the riſk commences and ends with the term, wherever the ſhip may then happen to be. If a ſhip be inſured *from* the port of London to any other port, and before ſhe breaks ground, an accident happen to her, the inſurers are not anſwerable; for the riſk does not commence till ſhe ſets ſail on her departure from the port of London: but if the inſurance be "*at and from*" the port of London, the inſurers are liable for any accident that may happen to her, "*from the time of ſubſcribing the policy.*" When a ſhip, in homeward voyages, expected to arrive at a certain place abroad, is inſured "*at and from*" that place, or from her arrival there, the riſk begins from the firſt moment of *her arrival at the place* ſpecified; and the words "*firſt arrival*" are implied, and always underſtood in policies ſo worded. As to the termination of the riſk on Engliſh policies, it is uſually made to continue only "*until the ſhip hath moored at anchor 24 hours in good ſafety.*" The riſk on the furniture, the rigging and tackle, and proviſions of the ſhip, may continue even when put on ſhore. With inſurers, a liberty to touch and ſtay at any ports and places, means ports and places in the uſual courſe of the voyage. This liberty to touch and ſtay at any ports or places, does not authorize the inſured to break bulk and trade. Although a ſhip, through neceſſity, change the order of the places at which ſhe is to touch, yet if ſhe do not abandon the original voyage, the riſk continues. In an inſurance upon freight, the riſk generally begins from the time the goods are put on board. If an accident happen to the ſhip before any goods are put on board, which prevents her from ſailing, the inſured cannot recover for the loſs of freight, which the ſhip might have earned if the accident had not happened. But if part of the cargo be put on board, and the reſt be ready to be ſhipped, the inſured may recover for the whole freight, upon a valued policy. (See POLICY.) If a ſhip be loſt in her way to her port of loading, the inſurer is liable for the whole freight.

If, after the inſurance is effected, any thing be done by the inſured to alter the nature of the riſk, this muſt be done with the conſent of the inſurer, otherwiſe it will avoid the contract.

Inſurances may likewiſe be made on goods ſent by land, or by hoys, &c. on rivers; and this is frequently done, more eſpecially on jewels, and other things of great value. They may likewiſe be made on ſhips and goods, loſt or not loſt, which is commonly done when a ſhip has been long miſſing; and thoſe words being inſerted in the policy, oblige the underwriters to pay, though the ſhip was loſt at the time of making ſuch inſurance, except the aſſured had then certain knowledge of the ſhip's being wrecked; in which caſe the ſubſcription ſhall not oblige, as this is accounted a mere fraud. So likewiſe if a perſon get more inſured than the ſhip is worth, with a villainous deſign to deſtroy her, this fraudulent act will not oblige the inſurers, but expoſe the proprietors to ſuffer death for their knavery. An inſurance made on prohibited goods is illegal and void, unleſs they were not prohibited till after the inſurance was made. The inſurance of ſeamen's wages is prohibited in all maritime countries; and by the law of England ſuch inſurance is unqueſtionably illegal. But they may inſure goods purchaſed abroad with their wages; and the captain is allowed to inſure goods which he has on board, or his ſhare in the ſhip, if he be a part-owner. By the law of France, the inſurance of freight, not actually earned, is prohibited; but in England the freight, as well as the ſhip, may be legally inſured. To entitle the owner, however, to recover for a loſs on a policy for freight, it muſt appear, that, before the loſs, the owner's right to freight had commenced; that is, that the ſhip had actually begun to earn freight, for till that time the riſk on freight does not commence. Although it is not unuſual in England to inſure profit, the queſtion whether this be a proper ſubject of inſurance has never yet come under ſolemn diſcuſſion. Where the policy expreſsly mentions that the ſhip is to depart with convoy, it is intended that ſhe ſhall, if poſſible, keep with the convoy during the voyage, and if ſhe depart wilfully from the convoy, it is a fraud; but if having departed with the convoy, ſhe by ſtreſs of weather loſes the convoy, and is taken, the inſurers are liable. (See WARRANTY.) If there be thieves on board among themſelves, the maſter of the ſhip is to anſwer for that, and not the inſurers; for though the words of the policy inſure againſt loſſes by thieves, yet aſſailing or external thieves are only here intended, and for external theft the inſurer as well as the owner of the ſhip is liable; but the proprietor of the goods, or the inſurers in his name, may recover againſt the owners. An inſurance made in a foreign country, may be ſued in England by the common law, if the inſurers come here. Where the policy is againſt reſtraint of princes, that does not extend to a navigation carried on againſt the law of nations, or where there ſhall be a ſeizure for not paying of cuſtoms or the like. If goods be inſured as the goods of an ally, when they are the goods of an enemy, it is a fraud, and the inſurance not good. If a man pays money on a policy of inſurance, ſuppoſing a loſs where there was none, this ſhall be money received for the uſe of the inſurer, for which he may maintain an action. A ſuppreſſion of the truth, or a falſe allegation, is ſufficient to diſcharge the policy; for it is a general rule, that the inſured ought to inform the inſurer of all material circumſtances that were come to his knowledge at the time of making the policy, in order that the contract may be fairly adjuſted; which being a contract upon chance, cannot be done, if one party knows more than the other; for equality in contracts, by the law-merchant, is eſſential; but a proof of an intention to make a deviation, will not avoid the policy before the deviation is actually made. See Representation.

By an act made in 19 Geo. II. c. 37. it is determined, that after the firſt day of Auguſt, 1746, no inſurance ſhall be made on ſhips or lading, "intereſt or no intereſt," or "without further proof of intereſt than the policy," or by way of gaming or wagering, or without benefit of ſalvage to the inſurer, and that every ſuch inſurance ſhall be void: that it ſhall not be lawful to make re-inſurance, unleſs the inſurer ſhall become inſolvent, become a bankrupt, or die: in which caſes ſuch inſurer, or his executors, &c. may make re-inſurance to the amount of the ſum before inſured, provided it be expreſſed in the policy to be a re-inſurance (ſee Reinsurance): that all ſums of money lent on bottomry or reſpondentia, upon any ſhips belonging to his majeſty's ſubjects, bound to or from the Eaſt Indies, ſhall be lent only on the ſhip or merchandize, laden, or to be laden, on board ſuch ſhip, and ſhall be ſo expreſſed in the condition of the bond; and the benefit of ſalvage ſhall be allowed to the lender, his agent or aſſigns, who alone ſhall have a right to make inſurance on the money ſo lent; and no borrower of money on bottomry, &c. ſhall recover more on any inſurance, than the value of his intereſt in the ſhip or merchandize, excluſively of the money ſo borrowed; and in caſe it ſhall appear, that the value of his ſhare in the ſhip and merchandize does not amount to the full ſum borrowed, ſuch borrower ſhall be reſponſible to the lender for ſo much of the money borrowed, as he hath not laid out on the ſhip or merchandize, with lawful intereſt for the ſame, together with the inſurance and all other charges, to the proportion which the money not laid out ſhall bear to the whole money lent, notwithſtanding the ſhip and merchandize be totally loſt. And, in all actions brought by the inſured, the plaintiff, or his attorney or agent, ſhall, within 15 days after he ſhall be required ſo to do, in writing, by the defendant, or his attorney or agent, declare in writing what ſum or ſums he hath inſured or cauſed to be inſured in the whole, and what ſums he hath borrowed, at reſpondentia or bottomry, for the voyage, or any part of the voyage in queſtion.

Whenever advice is received of the loſs of a ſhip or goods inſured, application is to be made to the inſurers, and the vouchers produced; and if they are ſatisfied, they will pay the money: but if they have cauſe to ſcruple the doing it, the inſured muſt ſtay till the inſurer can obtain a more ſatisfactory account; but if nothing be heard of the ſhip in any reaſonable time, the inſurers will be obliged to pay the money agreed upon.

In adjuſting a loſs, the quantity of damage for which the underwriters are reſponſible is firſt to be aſcertained; and the next point to be ſettled is by what rule this ſhall be appretiated. The adjuſtment is uſually indorſed on the policy and ſigned by the underwriters. When the loſs is admitted to be *total*, and the policy is a valued one, the inſured is entitled to receive the whole ſum inſured, ſubject to ſuch deductions as may have been agreed by the policy to be made in caſe of loſs. It is merely in reſpect of total loſs that any difference ſubſiſts between an open and a valued policy. Upon the latter the value is admitted, and the inſured has only to prove, if the inſurance was on goods, that the goods valued were on board. Upon an open policy, it is neceſſary to prove, not only that the goods were on board, but alſo the value of them, which the inſurers, provided it does not exceed the ſum inſured, are bound to pay. But in the caſe of a *partial* loſs, the amount of the loſs ſhould be aſcertained in both kinds of policy. When a part of the goods inſured is ſaved, and this exceeds the amount of the freight, the practice is to deduct the freight from the ſalvage, and to eſtimate the loſs by the difference; but when the freight exceeds the ſalvage, then it is a total loſs. If the goods inſured are damaged in the whole, or in part, it will be neceſſary to aſcertain the *quantity* of ſuch damage, which is done by taking the value of the goods, in their damaged ſtate, from the prime coſt; and the remainder will be the amount of the loſs. If ſeveral articles be inſured for one entire ſum, but with a diſtinct valuation to each, and only one be ſent in riſk, and if that one be loſt, the inſured ſhall recover ſuch a proportion of the ſum inſured as the value of that article bore to the value of the whole. If the policy has a clauſe, to be free of average from a particular riſk, under ſo much *per cent.* and a loſs occaſioned by that riſk takes place, the proportion which the loſs bears to the cargo muſt be calculated upon the cargo which was on board when the loſs happened, not upon that which was on board at any other time. With reſpect to the valuation of goods inſured, there has been a difference of opinion; ſome contending for the prime coſt, others for the current price at the time of loſs; ſome again inſiſting on the price at the time and place of ſhipping the goods, others on the price at the port of diſcharge. In England, if the policy be an open one, it is an invariable rule to eſtimate a total loſs, not by any ſuppoſed price which the goods might have been deemed worth at the time of the loſs, or for which they might have been ſold, if they had reached the market for which they were deſtined; but according to the prime coſt, that is, the invoice price, and all duties and expences till they are put on board, together with the premium of inſurance. The value is never affected by the riſe or fall of the market, nor by the courſe of exchange. A ſhip is valued at the ſum ſhe is worth at the time when ſhe ſails on the voyage inſured, including the expence of repairs, the value of her furniture, proviſions and ſtores, the money advanced to the ſailors, and, in general, every expence of the out-fit, to which is added the premium of inſurance. A partial loſs upon either ſhip or goods is that proportion of the prime coſt, which is equal to the diminution in value occaſioned by the damage. An adjuſtment, being indorſed on the policy and ſigned by the underwriters, with a promiſe to pay in a given time, is *primâ facie* evidence againſt them, and amounts to an admiſſion of all the facts neceſſary to be proved by the inſured to entitle him to recover in an action on the policy. It is like a note of hand, and being proved, the inſured has no occaſion for further proof. An adjuſtment, however, may be impeached by ſhewing that the underwriter was induced to ſign it by ſome fraud or concealment, or by ſome miſconception of the law or fact; but this muſt be done by evidence, and not by doubts or ſurmiſes after the time for payment is come.

If it be inquired, under what circumſtances the inſured ſhall be entitled to demand a return of premium, the particular caſes are as follow. In general, the premium ought to be returned, when the contract is void *ab initio;* that is, either for want of intereſt in the inſured, or becauſe the inſurance is illegal, or on account of fraud on the one ſide or the other. However, upon a wager-policy the inſured cannot recover back the premium, at leaſt after the riſk is run. 19 Geo. II. c. 37. But before the riſk is run, and while the contract is executory, the inſured may recover back the premium. If the contract be void, as being a re-inſurance, within the above cited ſtatute, the inſured ſhall not be intitled to a return of premium. If, under any circumſtances, the inſurer might, at any time, have been called upon to pay the whole ſum inſured, the premium is earned, and he ſhall not be obliged to return any part of it. Although an inſurance to protect trading with the enemy is void, yet the inſured ſhall not recover back the premium. In the caſe of fraud likewiſe on the part of the inſurers, the premium ſhall be returned. However it has been doubted, whether the inſurer be bound to return the premium, in a caſe where fraud has been committed by the inſured. The court of chancery, in two inſtances, ordered a return of premium where the policies were declared void for fraud committed by the inſured. The courts now hold a contrary doctrine. As to the commencement of the riſk, the rule in England is, that where the riſk has not been begun, whether this be owing to the fault, pleaſure, or will of the inſured, or to any other cauſe, the premium ſhall be returned. But if the inſurances be upon a voyage, diviſible into ſeveral diſtinct riſks, or, which amounts to the ſame, into ſeveral diſtinct voyages, the premium may be apportioned, according to theſe ſeveral riſks; and if one or more of theſe riſks ſhould not have been commenced, the proportion of premium applicable to thoſe parts ſhall be returned. But if the riſk be entire and be once commenced, there ſhall be no return. If part of the premium is to be returned upon the performance of ſome ſtipulation agreed upon between the parties, this ſhall be returned, though the inſurer be obliged to pay a partial loſs. As the inſurer can never, by his own act, diſcharge himſelf from the contract, it ſeems reaſonable, that, where the inſured thinks proper to put a ſtop to the adventure, and prevent the riſk from ever commencing, he ſhould make ſome compenſation to the inſurer for his trouble and diſappointment; it is therefore the general cuſtom in all the maritime countries of Europe, to allow him to retain one-half *per cent.*

With regard to actions on policies of inſurance, the ſole juriſdiction belongs to the courts of common law; and the proper form of action againſt private underwriters, is ſpecial "Aſſumpſit;" which ſee. The two inſurance companies, being corporations, can do no act but by deed under their common ſeals. Their policies of inſurance, being under ſeal, no action of "Aſſumpſit" will lie upon them, but only debt of covenant. See ſtat. 6 Geo. I. c. 18, and 8 Geo. I. c. 30. The evidence generally adduced on the part of the plaintiff is reducible to the following heads, *viz.* proof of the contract, payment of the premium, intereſt of the inſured, performance of warranties and loſs. For a further detail of theſe and other particulars, relating to matters of inſurance, and the determinations of judges and courts of law in illuſtration and confirmation of them, ſee "A Treatiſe on the Law of Inſurance," by Samuel Marſhall, ſerjeant at Law, in 2 vols. Lond. 1802. On this ſubject, ſee farther under BARRATRY, *Inſurance* BROKERS, DEVIATION, POLICY, SALVAGE, UNDERWRITERS, and WARRANTY. See alſo BOTTOMRY and RESPONDENTIA.

INSURANCE *upon Lives*, is a contract by which the inſurer, in conſideration of a certain premium, either in a groſs ſum or by annual payments, undertakes to pay the perſon, for whoſe benefit the inſurance is made, a ſtipulated ſum of money, or an equivalent annuity, upon the death of the perſon whoſe life is inſured, whenever this ſhall happen, if the inſurance be for the whole life, or in caſe this ſhall happen within a certain period, if the inſurance be for a limited time. For the principles on which this kind of inſurance is made, and other particulars relating to it, ſee the article ASSURANCE. It is generally a condition or warranty, in inſurances upon lives, either inſerted in the policy, or contained in a declaration or agreement ſigned by the inſured, that the perſon whoſe life is meant to be inſured has not any diſorder which tends to the ſhortening of life; that he has, or has not, had the ſmall-pox; and that his age does not exceed ſo many years; that this declaration ſhall be the baſis of the contract between the inſurers and the inſured; and that if any untrue averment be contained therein, the contract ſhall be void, and all money paid on account of the inſurance forfeited. As this declaration is to be taken as part of the written contract, amounting to a warranty, it behoves every perſon who makes an inſurance upon a life, to be very circumſpect in aſcertaining the truth of the allegations which it contains; becauſe upon that the validity of the contract muſt depend. When there is no warranty, the inſurer takes the riſk upon himſelf, whatever may be the ſtate of health of the perſon whoſe life is inſured, unleſs there be ſome fraudulent miſrepreſentation or concealment.

In order to check the ſpirit of gaming, which is ready to avail itſelf of inſurance upon lives, it is enacted by ſtat. 14 Geo. III. c. 48. § 1, that no inſurance ſhall be made by any perſon or perſons, bodies politic or corporate, on the life or lives of any perſon or perſons, or on any other event or events whatever, wherein the perſon or perſons, for whoſe uſe or benefit, or on whoſe account, ſuch policy or policies ſhall be made, ſhall have no intereſt, or by way of gaming or wagering; and that every inſurance made contrary to the true intent and meaning of this act, ſhall be null and void to all intents and purpoſes whatſoever; and that it ſhall not be lawful to make any policy or policies on the life or lives of any perſon or perſons, or other event or events; without inſerting in ſuch policy or policies the name or names of the perſon or perſons intereſted therein, or for what uſe or benefit, or on whoſe account, ſuch policy is ſo made or underwrote;—and that in all caſes where the inſured hath an intereſt in ſuch life or lives, event or events, no greater ſum ſhall be recovered, or received from the inſurer or inſurers, than the amount or value of the intereſt of the inſured in ſuch life or lives, or other event or events. This act extends to every ſpecies of inſurance except marine inſurances, which are expreſly excepted. The different inſurance companies annex to the contract certain conditions or exceptions. For thoſe of the "Royal Exchange Aſſurance" (ſee ASSURANCE.) The ſame exceptions are adopted by the "Weſtminſter Society." The "Equitable Aſſurance," and the "Pelican Life-inſurance," adopt the ſame exceptions, only omitting the word "duelling," even where the party inſures his own life. Other ſocieties for inſurance on lives, ſuch as the "Rock Inſurance Society," &c. have been more recently eſtabliſhed, and inſurances of this kind are made by ſome of thoſe ſocieties, which will be noticed in the next article.

The ſocieties which reſtrict themſelves to inſurance on lives are the following; *viz.* the "Amicable Society," incorporated by royal charter of queen Anne in 1706, ſanctioned by the grant of two ſubſequent charters in 1730 and in 1790, and further improved under the powers conferred by a new charter in 1807. By virtue of this charter, perſons are admitted to inſure their own lives, or the lives of others, in which they may have an intereſt, on the following payments:

Table for the whole of life, for each ſhare, amounting to 180*l. with ſuch addition as the circumſtances of the year may produce*, to be paid on the death of the inſured.

Age.	Premium on Admiſſion.	Annual Contribution.	Age.	Premium on Admiſſion.	Annual Contribution.
	£. s. d.	£. s. d.		£. s. d.	£. s. d.
8 to 14	1 11 0	3 8 6	41	2 6 0	6 11 0
15	1 11 6	3 10 6	42	2 6 6	6 15 0
16	1 12 0	3 12 6	43	2 7 0	6 19 0
17	1 12 6	3 15 0	44	2 8 0	7 3 0
18	1 13 0	3 17 0	45	2 9 0	7 7 0
19	1 14 0	3 19 0	46	2 9 6	7 11 6
20	1 14 6	4 0 6	47	2 10 6	7 16 0
21	1 15 0	4 2 0	48	2 11 0	8 1 6
22	1 15 6	4 4 0	49	2 12 0	8 7 0
23	1 16 0	4 5 6	50	2 13 0	8 12 0
24	1 16 6	4 7 0	51	2 14 0	8 18 0
25	1 17 0	4 9 0	52	2 14 6	9 4 0
26	1 17 6	4 11 0	53	2 15 6	9 10 0
27	1 18 0	4 13 0	54	2 16 0	9 17 0
28	1 18 6	4 15 0	55	2 16 6	10 4 0
29	1 19 0	4 17 0	56	2 17 6	10 11 0
30	1 19 6	4 19 0	57	2 18 6	10 19 0
31	2 0 0	5 1 6	58	2 19 6	11 7 6
32	2 0 6	5 4 0	59	3 0 6	11 16 6
33	2 1 0	5 6 0	60	3 1 6	12 6 0
34	2 1 6	5 9 0	61	3 2 6	12 16 0
35	2 2 6	5 11 6	62	3 3 6	13 7 0
36	2 3 0	5 14 6	63	3 4 6	13 19 0
37	2 3 6	5 17 6	64	3 5 6	14 11 6
38	2 4 0	6 1 0	65	3 6 6	15 6 0
39	2 4 6	6 4 0	66	3 7 6	16 1 0
40	2 5 0	6 7 6	67	3 8 6	16 17 6

The whole of the annual contributions for every ſhare granted previous to the laſt charter, and ſeven eighths of the contributions on ſhares ſubſequently granted, are to be divided every year amongſt the claimants by deaths which happen in that year: a principle of diviſion, which is calculated, in the general courſe of things, to raiſe each claim conſiderably above 180*l.* which ſum at leaſt the corporation engages each ſhare ſhall produce to the claimant. See ASSURANCE.

The "Society for Equitable Aſſurances on Lives and Survivorſhips" was eſtabliſhed by deed, inrolled in his majeſty's court of king's bench, Weſtminſter. For an account of this ſociety, which has acquired high reputation, under the conduct of its preſent actuary, William Morgan, eſq. ſee ASSURANCE. The "Weſtminſter Life Inſurance Office" was eſtabliſhed in 1792. The "Pelican Office" for inſurance of lives, granting annuities and endowment of children, was eſtabliſhed in the year 1797. The "Rock Life Aſſurance Company" was inſtituted in 1806, on a principle different from that of any ſociety hitherto eſtabliſhed for the aſſurance of a ſum to the repreſentatives of a perſon aſſured. The company conſiſts of a number of proprietors, poſſeſſing a capital ſtock of one million; and each proprietor is under the neceſſity of aſſuring a ſum on his own life, if accepted by the directors; or on that of an approved nominee, to the amount of one quarter of the ſtock in his name. Thus by aſſuring each other's lives, the proprietors have a mutual intereſt in the ſupport of the ſociety, and are engaged to each other to take care that no improper life, with their knowledge, be admitted into it. By the mode of aſſuring property in this ſociety, the repreſentatives of the aſſured receive a certain ſum at his deceaſe, and whatever addition may have been aſſigned to that ſum by the previous reſolution of the ſociety, agreeably to its deed of ſettlement. The perſons who aſſure in this office are not all partners; they are not all reſponſible for the payment of the ſum aſſured to each individual. The aſſured are either proprietors or non-proprietors. The proprietors are anſwerable each to a certain amount; they lay down a certain ſum, and form a determinate capital to anſwer all contingencies, and by thus forming a capital, they are enabled to make a due aſſignment of the ſum to be added at different periods to various policies of aſſurance. The aſſured non-proprietors have no ſhare in the riſk: they pay down definite premiums, which aſſure to the repreſentatives the ſum aſſured, and who partake equally with proprietors in the addition which may be made at different periods to each policy. The ſecurity for the payment of that ſum is the capital ſtock of the company and the amount of all the premiums, with the intereſt upon them. Such a ſecurity, it is ſaid, may be deemed as a "rock," whence we apprehend the company derives its appellation; for the transfer of ſhares will produce a continual renovation of policies, which, with the capital of the company, and the amount of annual payments from aſſurances, will form an increaſing fund, adequate to every purpoſe of profit and ſecurity. The character of William Frend, eſq. the actuary of this ſociety, as a mathematician, is well known. The "Provident Life Inſtitution" was eſtabliſhed in 1806. In the ſame year was alſo eſtabliſhed the "Philanthropic Annuity Inſtitution;" the object of which is to enable thoſe, who wiſh to raiſe an immediate ſum of money by the grant of annuities, or to inveſt money for the purpoſe of accumulation, to do it on the moſt advantageous terms ſuited to the various circumſtances and contingencies of life; and alſo to provide endowments for children, &c. The inveſtment of money in this inſtitution may be made in three different ways: 1ſt, by paying a certain ſum of money down, to receive an annuity, to commence immediately: 2dly, by paying down a certain ſum of money, to receive an annuity, to commence at a future time: and, 3dly, by paying a ſum of money at particular periods, to receive back a ſum, or an annuity when the inveſtor requires it. The "London Life Aſſociation" for the aſſurance of lives, conſiſts of perſons inſuring their reſpective lives for the whole term of life; and the members become, to the amount of their policies, mutual aſſurers to one other. The ſociety alſo undertakes every deſcription of aſſurance on the lives of perſons, not members; and it is part of its plan to make endowments, and to grant and purchaſe annuities, by virtue of an act of parliament of the 47th Geo. III. c. 32. The diſtinguiſhing principle of this ſociety is, that the benefits reſulting from its tranſactions ſhall be enjoyed by the members, during life, ſo as to render life aſſurance as eaſy to the aſſured, as a due regard to ſecurity will admit. The "Royal Exchange Aſſurance Annuity Company" has been already mentioned under the article ASSURANCE: but in May 1803, the following table of rates was formed:

A Table of Rates of the Royal-Exchange Aſſurance Annuity Company.

Single Lives.

Age.	Years Pur-chaſe.	perCent. per Ann.		Age.	Years Pur-chaſe.	perCent. perAnn.		Age.	Years Pur-chaſe.	perCent perAnn.	
		£.	s.			£.	s.			£.	s.
3	16,39	6	2	30	15,87	6	6	57	11,63	8	12
4	16,66	6	0	31	15,87	6	6	58	11,36	8	16
5	16,95	5	18	32	15,62	6	8	59	11,11	9	0
6	16,95	5	18	33	15,62	6	8	60	10,87	9	4
7	17,24	5	16	34	15,38	6	10	61	10,63	9	8
8	17,24	5	16	35	15,38	6	10	62	10,41	9	12
9	17,24	5	16	36	15,15	6	12	63	10,20	9	16
10	17,24	5	16	37	15,15	6	12	64	10,00	10	0
11	17,24	5	16	38	14,92	6	14	65	9,80	10	4
12	17,24	5	16	39	14,92	6	14	66	9,61	10	8
13	17,24	5	16	40	14,70	6	16	67	9,43	10	12
14	16,95	5	18	41	14,49	6	18	68	9,25	10	16
15	16,95	5	18	42	14,28	7	0	69	9,00	11	2
16	16,95	5	18	43	14,08	7	2	70	8,77	11	8
17	16,95	5	18	44	13,88	7	4	71	8,54	11	14
18	16,66	6	0	45	13,70	7	6	72	8,33	12	0
19	16,66	6	0	46	13,51	7	8	73	8,13	12	6
20	16,66	6	0	47	13,33	7	10	74	7,93	12	12
21	16,66	6	0	48	13,15	7	12	75	7,75	12	18
22	16,39	6	2	49	12,98	7	14	76	7,57	13	4
23	16,39	6	2	50	12,82	7	16	77	7,40	13	10
24	16,39	6	2	51	12,65	7	18	78	7,24	13	16
25	16,39	6	2	52	12,50	8	0	79	7,09	14	2
26	16,12	6	4	53	12,34	8	2	80	6,94	14	8
27	16,12	6	4	54	12,19	8	4	upwards	6,94	14	8
28	16,12	6	4	55	12,05	8	6				
29	15,87	6	6	56	11,90	8	8				

Joint Lives and the Survivor.

Ages.	Years Purchaſe.	per Cent. per Ann.		Ages.	Years Purchaſe.	per Cent. per Ann.	
		£.	s.			£.	s.
45 & 45	15,87	6	6	40 & 45	16,66	6	0
46 46	15,62	6	8	50	16,39	6	2
47 47	15,38	6	10	55	16,12	6	4
48 48	15,15	6	12	60	15,87	6	6
49 49	14,92	6	14	65	15,62	6	8
50 50	14,70	6	16	70	15,38	6	10
51 51	14,49	6	18	75	15,15	6	12
52 52	14,28	7	0	80	14,92	6	14
53 53	14,08	7	2	45 & 50	15,38	6	10
54 54	13,88	7	4	55	15,15	6	12
55 55	13,70	7	6	60	14,92	6	14
56 56	13,51	7	8	65	14,70	6	16
57 57	13,33	7	10	70	14,49	6	18
58 58	13,15	7	12	75	14,28	7	0
59 59	12,98	7	14	80	14,08	7	2
60 60	12,18	7	16	50 & 55	14,28	7	0
61 61	12,65	7	18	60	14,08	7	2
62 62	12,50	8	0	65	13,88	7	4
63 63	12,34	8	2	70	13,70	7	6
64 64	12,19	8	4	75	13,51	7	8
65 65	12,05	8	6	80	13,33	7	10
66 66	11,90	8	8	55 & 60	13,33	7	10
67 67	11,76	8	10	65	13,15	7	12
68 68	11,63	8	12	70	12,98	7	14
69 69	11,36	8	16	75	12,82	7	16
70 70	11,11	9	0	80	12,65	7	18
71 71	10,87	9	4	60 & 65	12,50	8	0
72 72	10,63	9	8	70	12,34	8	2
73 73	10,41	9	12	75	12,19	8	4
74 74	10,20	9	16	80	11,90	8	8
75 75	10,00	10	0	65 & 70	11,63	8	12
76 76	9,80	10	4	75	11,36	8	16
77 77	9,52	10	10	80	11,11	9	0
78 78	9,25	10	16	70 & 75	10,63	9	8
79 79	9,00	11	2	80	10,10	9	18
80 80	8,69	11	10	75 & 80	9,61	10	8
85 85	8,00	12	10	80 & 85	8,47	11	16

N. B. The foregoing annuities are receivable in quarterly Payments.

Insurances *againſt Fire*, are founded on a contract, by which the inſurer, in conſideration of a certain premium, received by him, either in a groſs ſum, or by annual payments, undertakes to indemnify the inſured againſt all loſs or damage which he may ſuſtain in his houſes or other buildings, goods, and merchandize, by fire, during a limited period of time. Although the preciſe time of the introduction of this kind of inſurance into England cannot be aſcertained, it has certainly been in uſe here conſiderably more than a century. Of late years, notwithſtanding a very heavy, and we may add impolitic, ſtamp-duty impoſed on theſe inſurances, they have very generally, not to ſay univerſally, prevailed in this country: particularly in London, and other cities and large towns. In other countries they have been leſs general, and more recently introduced. The fire-office at Paris is ſaid to have been eſtabliſhed in 1745. In Holland, though inſurance againſt fire is not altogether unknown, yet few people ſeek its protection; becauſe they rely on their own caution, and do not chuſe to incur the expence of any greater ſecurity. It has, indeed, been confidently aſſerted, by perſons well acquainted with the cities both of London and Amſterdam, that after making all fair allowances, there is, upon an average, more property deſtroyed by fire in the former in one year than in the latter in ſeven years. Some perſons have charged many of the fires that occur in London and its vicinity on inſurance; but though negligence and fraud may in ſome inſtances derive encouragement from this eſtabliſhment, the benefits muſt be allowed far to overbalance the miſchiefs of which it is, directly or indirectly, productive. In London and other parts of the kingdom, companies or ſocieties for inſurances againſt fire have been very numerous; and their number has poſſibly been augmented by the emoluments that accrue to thoſe who eſtabliſh and conduct them. Some of theſe are called "Contribution Societies," in which every perſon inſured becomes a member or proprietor, participating in profit and loſs. Such are the "Hand in Hand," and the "Weſtminſter" fire-offices, for the inſurance of houſes and other buildings; and the "Union" fire-office, for inſurance of goods. The other companies inſure both houſes and goods at their own riſk. Of theſe the principal are the "London" and "Royal-Exchange" Aſſurance Corporations, the "Sun," the "Phœnix," and the "Britiſh" fire-offices.

As to the duties to which this contract is liable, the ſtat. 37 Geo. III. c. 90. § 23. repeals all the former ſtamp-duties impoſed on policies of inſurance againſt fire; and (by § 24.) impoſes on every policy, in lieu thereof, a new duty of *three ſhillings*, where the ſum inſured is under 1000*l.*, and of *ſix ſhillings* where the ſum inſured amounts to 1000*l.* or upwards. And by the ſtat. 44 Geo. III. a duty of *two ſhillings and ſixpence per cent. per annum* is to be levied on property inſured againſt fire. It is much to be regretted, that inſurances againſt fire are often made to a large amount upon property of very ſmall value; this can only be done with a fraudulent view, and a premeditated fire muſt be the neceſſary conſequences. Such practices require caution in the inſurers, ought to be reſtrained, and when they occur ſeverely puniſhed. If there be ſeveral inſurances on the ſame property in different offices, each office ſhould have notice, that the ſame may be allowed by indorſement on the policy; in order that each office may bear its rateable proportion of any loſs that may happen. But unleſs ſuch notice be given to the office where another inſurance is made on the ſame effects, the inſurance made without ſuch notice will be void. In general, the riſk commences from the ſigning of the policy, unleſs ſome other time be ſpecified; and it will of courſe end with the term for which it is made. Inſurances againſt fire are, in general, either annual or for a term of ſeven years, at an annual premium; and the offices, as an indulgence to the inſured, generally allow fifteen days from the expiration of each year for the payment of the premium for the next ſucceeding year. But the inſured has always been conſidered as being under the protection of the policy till the expiration of the fifteen days, provided the premium were paid within that time. Several offices now hold themſelves liable for any loſs during the fifteen days that are allowed for the payment of the renewed premium upon annual policies, and others for a longer period; but every policy for a ſhorter period than a year ceaſes at ſix o'clock in the evening of the day that is mentioned in it. A policy of inſurance, being a choſe in action, is, in ſtrictneſs, not aſſignable at law; but it may be aſſigned in equity. However, the mere aſſignment of the policy would be of little avail without an aſſignment of the ſubject-matter of the inſurance alſo. In the printed propoſals of all the offices, it is declared, that, upon the death of an inſured, his intereſt in the policy ſhall be continued to his repreſentative to whom the property inſured belongs, provided that ſuch repreſentative, before any new payment be made, procure his right to be indorſed on the policy at the office. The policies of the Contribution Societies, *viz.* the "Hand in Hand," "Union," and "Weſtminſter," may be aſſigned, without any expreſs permiſſion from the reſpective offices for that purpoſe; and it is ſufficient if the aſſignment be brought to the reſpective offices to be entered. But the other offices give notice, generally upon the policy, that it ſhall be of no force if aſſigned, unleſs ſuch aſſignment be allowed by an entry in the books of the office, or indorſed on the policy: and hence it ſeems to be a ſettled rule in all the offices, not to allow any transfer of any policy without the conſent of the managers. If an aſſignor of the property inſured undertake to get the policy transferred to the aſſignee, he will be liable to an action for neglecting to do it; even though his undertaking was merely gratuitous. For the proof and recovering of loſs, the following article is found in the propoſals of ſeveral of the offices, importing, "that perſons inſured ſuſtaining any loſs or damage by fire, are forthwith to give notice thereof at the office, and, as ſoon as poſſible afterwards, deliver in as particular an account of their loſs and damage as the nature of the caſe will admit of; and make proof of the ſame by their oath or affirmation, according to the form practiſed in the ſaid office; and by their books of accounts, or other proper vouchers, as ſhall be reaſonably required; and procure a certificate under the hands of the miniſter and churchwardens, together with ſome other reputable inhabitants of the pariſh not concerned in ſuch loſs, importing, that they are well acquainted with the character and circumſtances of the perſon or perſons inſured, and do know, or verily believe, that he, ſhe, or they, really and by misfortune, without any fraud or evil practice, have ſuſtained by ſuch fire the loſs and damage, as his, her, or their loſs, to the value therein mentioned. But till ſuch affidavit or certificate of ſuch inſured's loſs ſhall be made and produced, the loſs-money ſhall not be payable. And if there appears any fraud or falſe ſwearing, ſuch ſufferers ſhall be excluded all benefit by their policies." In the policies of theſe offices the inſurers undertake to pay the loſs, not exceeding the ſum inſured, "according to the exact tenor of their printed propoſals," deſcribing their propoſals by their reſpective dates.

Inſurances againſt fire are deſcribed in the plans and propoſals of the different ſocieties, with little variation, as *common*, *hazardous*, and *doubly hazardous*; and they comprehend buildings and goods. *Buildings* ſubject to *common* inſurances are thoſe of brick or ſtone, ſtanding alone, or ſeparated by partition walls, and covered with ſlate, tile, copper, lead, or iron, with brick chimnies; in which no hazardous trades are carried on, or hazardous goods depoſited. *Goods* are houſhold goods, in private dwellings, merchandize and ſtock, not hazardous, in brick or ſtone buildings as above deſcribed, and in which no hazardous trades are carried on, nor hazardous goods depoſited. *Hazardous* inſurances comprehend *buildings* of timber or plaſter, brick and timber, or brick and ſtone, not having party walls of brick or ſtone, wherein no hazardous trades are carried on, or hazardous goods depoſited, brick or ſtone buildings in which hazardous trades are carried on, or hazardous goods depoſited; alſo thatched barns and out-houſes (having no chimnies, or adjoining to any building having a chimney), containing farmer's ſtock or implements of huſbandry: likewiſe all ſhops and warehouſes which have German or metal ſtoves with pipes. *Goods* ſubject to the ſame kind of inſurance are the ſtock and goods of bread-bakers, brewers, vinegar and ſweet-makers, printers, hot-preſſers and calenderers, carpenters, chemiſts, coach-makers, colour-men, coopers, hemp and flax-dreſſers, innholders, malthouſes, oil leather-dreſſers, ſhip and tallow-chandlers, ſtable-keepers, pawn-brokers, hemp, flax, pitch, tar, turpentine, roſin, tallow, hay, ſtraw, and all manner of fodder, and corn unthraſhed, apothecaries' ſtock; alſo, oil and ſpirituous liquors, as merchandize and the ſtock in timber-yards. *Doubly hazardous* inſurances comprehend *buildings* which are thatched, alſo timber or plaſter buildings, in which hazardous goods are depoſited, or hazardous trades carried on; and *goods* or ſtock in thatched dwellings; alſo ſalt-petre, working-perfumers, tallow-melters, wax-chandlers, ſpermaceti candle-makers, and rope-makers in brick and tiled buildings, boat-builders, china, glaſs, or earthen wares.

The "Hand in Hand Fire-office" was inſtituted in the year 1696; and its terms are, for *common* inſurances, 3000*l.* or under, 2*s. per cent. per annum:* for *hazardous* inſurances, 3000*l.* or under, 3*s. per cent. per annum:* for *doubly hazardous* inſurances, 3000*l.* or under, 5*s. per cent. per annum.* If inſurances are deſired for any larger ſums than are ſpecified in the table of premiums, a ſpecial agreement may be made for the ſame, and alſo for particular buildings, goods, &c. not included in the ſecond and third articles above enumerated. Perſons inſuring in this office are allowed one year's premium and duty, and muſt pay the requiſite premiums and depoſit according to the nature of the riſk. They become joint proprietors and members of the ſociety, and are entitled to a proportionate ſhare of the profits.

The "Union Fire-office" was inſtituted in 1714, for inſuring houſes and buildings, goods, merchandize, and ſhips in harbour, in dock, or while building, from loſs or damage by fire. The ſeptennial inſurances are allowed one year's premium and duty, and become proprietors, partaking of the profits of the ſociety. The annual or ſhort period inſurers are completely protected from any loſs or damage by fire, or from any call or contribution towards any loſs or damage happening to others, by a very ample fund which has been raiſed for that purpoſe.

TABLE OF ANNUAL PREMIUMS.

(Excluſive of Government Duty.)

	Common.	Hazardous.	Doubly Hazardous.
£.	£. s. d.	£. s. d.	£. s. d.
On ſums not exceeding 3000	0 2 0 *per cent.*	0 3 0 *per cent.*	0 5 0 *per cent.*
——— 6000	0 2 6 *per cent.*	0 4 0 *per cent.*	0 6 0 *per cent.*
Larger Sums may be inſured by ſpecial Agreement.			

No charge is made for policies of 300*l.* and upwards. Farming ſtock may be inſured at 2*s. per cent.*. The "Royal Exchange Aſſurance," of which we have given an account, as far as it is a life-inſurance office, under ASSURANCE, inſures alſo from loſs or damage by fire.

TABLE OF ANNUAL PREMIUMS.

(Not including Duty.)

Common Aſſurances.	Hazardous Aſſurances.	Doubly Hazardous Aſſurances.
Not exceeding 3000*l.* 2*s. per cent.*	Not exceeding 2000*l.* 3*s. per cent.*	Not exceeding 2000*l.* 5*s. per cent.*
Larger Sums may be aſſured by ſpecial Agreement; and Farming Stock at 2*s. per cent.*		

The corporation of the "London Aſſurance" inſures houſes and goods from fire, and alſo inſures lives. (See ASSURANCE.) The premiums are as follows:

Common Aſſurances.	Hazardous Aſſurances.	Doubly Hazardous.
Sums not exceeding 10,000*l.* 2*s. per cent.*	Sums not exceeding 3000*l.* .... 3*s.* 0*d. per cent.*	——— 5*s. per cent.*
—— above 10,000*l.* 2*s.* 6*d.*	Above 3000*l.* and not exceeding 5000*l.* 3*s.* 6*d.*	Farming Stock, 2*s.* with average clauſe.
	Above 5000*l.* .... 4*s.* 0*d.*	

Perſons aſſuring for ſeven years, will be allowed one year's premium, and duty; for ſix years, 10 *per cent.* on the premium; for five years, 8 *per cent.*; for four years, 6 *per cent.*; for three years, 4 *per cent.*; for two years, 2 *per cent.*

Premiums of aſſurance from fire for ſhips in harbour, building, or repairing, or for cargoes, or for veſſels and other craft employed in inland navigation, and goods, &c. laden thereon.

		For one Year.	For ſix Months.	For three Months.	
	£.	*s.* *d.*	*s.* *d.*	*s.* *d.*	
Sums not exceeding	10,000	3 0	2 6	2 0	*per cent.*
Above	10,000	4 0	3 0	2 6	

Five *per cent.* diſcount allowed on premium. The premium on goods, hazardous or not hazardous, in any of the warehouſes or ſheds, or on the open wharfs, or in any part of the port of London, within five miles of the Royal Exchange (the Weſt India docks excepted), with the average clauſe, 5*s.* *per cent.*; on goods not hazardous, ſimilarly ſituated, 3*s.* *per cent.* The average clauſe, ſo often referred to, is as follows: It is agreed, that if the goods aſſured ſhall be of greater value than the ſum aſſured, and the ſame ſhall not be totally conſumed, the inſurer ſhall only be liable to pay ſuch a proportion of the loſs as the ſum aſſured ſhall bear to the whole value of the goods at the time of the breaking out of any fire. On ſums of 300*l.* and upward, the policy and mark are allowed gratis.

The "Sun Fire-office" was eſtabliſhed in the year 1710, and inſures againſt loſs or damage by fire, upon the following terms.

Table of Rates.

Annual Premiums to be paid for Inſurances.				
Sums not exceeding	10,000	Common	2*s.* *per Cent.*	Sums above may be inſured by Special Agreement.
	6,000	Hazardous . . .	3*s.* Ditto.	
	3,000	Doubly Hazardous .	5*s.* Ditto.	
Farming Stock, on any Part of the Farm, inſured under General Policies, without the Average-Clauſe, at 2*s.* *per Cent.*				
N. B. Any barn, or other out-building, and the farming ſtock therein, may be inſured under one ſum:—premium 3*s.*				

Perſons may inſure for more years than one, not exceeding ſeven; and, in ſuch caſe, there will be an abatement of ſix-pence in the pound per annum, on the premiums agreed for, for every year except the firſt: In a common inſurance of 1000*l.* for ſeven years, the premium to be paid, by the table, will be ſeven pounds, in which the ſix-pence in the pound per annum is to be deducted for the laſt ſix years, that is, three ſhillings and ſix-pence per annum, which amounts to one pound one ſhilling, and reduces the ſum to be paid to five pounds nineteen ſhillings, and the ſame in proportion for any other ſum or number of years; and perſons inſuring can never be ſubject to any calls or contributions to make good loſſes.

The "Sun Life Aſſurance Society" grants annuities, makes aſſurances on lives and ſurvivors, and provides for the endowment of children; on the terms, and in the manner of other offices for inſuring lives.

"The Weſtminſter Fire-office" was eſtabliſhed in the year 1717. The terms are, in the firſt claſs of common inſurances, for any ſum not exceeding 10,000*l.*, 2*s.* *per cent.* *per annum*; in the ſecond claſs of hazardous inſurances, for any ſum not exceeding 6000*l.*, 3*s.* *per cent.* *per annum*; in the third claſs of doubly hazardous inſurances, for any ſum not exceeding 3000*l.*, 5*s.* *per cent.* *per annum.* The fourth claſs includes inſurances by ſpecial agreement. Every ſeptennial inſurer becomes a member of the ſociety, and ſhall be allowed one year's premium; he will alſo have a proportionable ſhare of the profits, and be liable to contribute to loſſes, but not to exceed 10*s.* *per cent.* on the firſt; 15*s.* on the ſecond; and 20*s.* on the third claſs of inſurances.

The "Phœnix Fire-office" was eſtabliſhed in 1782; and its premiums are for common inſurances, for ſums not exceeding 3000*l.*, 2*s.* *per cent.* *per annum*; for hazardous inſurances, for ſimilar ſums, 3*s.* *per cent.* *per annum*; and for double hazardous inſurances, the ſums being the ſame, 5*s.* *per cent.* *per annum.* Hay and corn in barns or ſtacks, and other farming ſtock, may be inſured at 2*s.* *per cent.* *per annum.* Ships, barges, and all kinds of water-craft; alſo, cargo on board may be inſured at 3*s.* *per cent.* *per annum*, for ſums not exceeding 3000*l.* Inſurances on larger ſums, and on goods, &c. peculiarly hazardous, may be effected by ſpecial agreement. Perſons chuſing to inſure for ſeven years, will be charged for ſix years only; and for any number of years, more or leſs than ſeven, will be allowed a reaſonable diſcount both on the premium and the inſurance tax.

"The Globe Inſurance" was eſtabliſhed in 1803, and comprehends the granting inſurances againſt loſs or damage by fire, on lives and ſurvivorſhips, the endowment of children, and immediate, deferred, and progreſſive annuities. This office makes common inſurances at an annual premium of 2*s.* *per cent.*; hazardous inſurances at 3*s.* *per cent.*; and doubly hazardous inſurances at the annual premium of 5*s.* *per cent.* Farming ſtock is inſured at 2*s.* *per cent.*; and this may be inſured for three, ſix, or nine calendar months at certain ſtipulated rates. Policies are allowed in all caſes where the annual premium amounts to 6*s*. Inſurances for ſeven years are charged only ſix years premiums; and a conſiderable reduction is made on country inſurance. The inſurances on lives and on ſurvivorſhip are made at the rates of other offices; nor does the company require entrance money, or admiſſion fees, from perſons effecting life inſurances. The capital of the company is ſtated to be one million ſterling, the whole of which has been inveſted in government or real ſecurities, and it is ſtipulated that no members of the company ſhall be liable to pay any ſum beyond the amount of his ſubſcription or ſhare in the ſaid capital of one million.

The "Imperial Fire-office" was eſtabliſhed in 1803. Its capital, of one million two hundred thouſand pounds ſterling, has been ſubſcribed in ſhares of 500*l.* each; and no member is a ſubſcriber for more than 5000*l.* Each member has depoſited 10*l. per cent.* on the amount of his ſubſcription, amounting in the whole to 120,000*l.* which ſum is inveſted, and to accumulate for five years, without dividends to the members of the company. In caſe the current premiums on inſurances, with the depoſit of 120,000*l.* and all its accumulations, ſhall prove inadequate to ſatiſfy the loſſes which may ariſe, the members of the company are, from time to time, to be called upon for farther ſums, in proportion to their ſubſcriptions, and even to their full extent, if neceſſary. If the current premiums ſhall be more than ſufficient to anſwer loſſes, and the expences of management, the ſurplus is, from time to time, to be inveſted; but ſuch profits are in no event to be divided, but are to be applied for augmentation of the capital ſtock; and the dividends and intereſt of the profits only are to be divided, after the expiration of five years. The premium in common inſurances is 2*s. per cent. per annum* for 3000*l.* and under; in hazardous inſurances, 3*s. per cent. per annum*, for 1000*l.* or under; and in double hazardous inſurances, 5*s. per cent. per annum*, for 1000*l.* or under. Perſons chuſing to inſure for ſeven years will be charged for ſix years only; and for any number of years, leſs than ſeven, will be allowed a reaſonable diſcount, both on the premium and duty.

The "Albion Fire and Life Inſurance Company" was inſtituted in the year 1805; and is ſtated to poſſeſs a capital of one million ſterling. Its inſurance againſt loſs or damage by fire is in the firſt claſs of common inſurances 2*s per cent. per annum*, to the amount of 3000*l.*; in the ſecond claſs of hazardous inſurances, 3*s. per cent.* annually; and in the third claſs of doubly hazardous inſurances, 5*s. per cent. per annum* both to the ſame amount. Inſurances are taken to a larger amount than that above ſtated; and policies are granted at ſuitable premiums for leſs than 12 months. On inſurances for ſeven years, or for any greater or leſs term, exceeding one year, a conſiderable allowance is made, both on the premium and duty. The following abatements are made on the premiums of fire inſurances of the firſt claſs, out of London; *viz.* 25 *per cent. per annum* on policies for ſingle years; 30 *per cent.* on policies for three years; 35 *per cent.* on policies for five years; 40 *per cent.* on policies for ſeven years; and in the like proportion for policies for other periods. Inſurances on lives are conducted on the ſame terms with thoſe of other offices of a ſimilar kind. No admiſſion fine is charged on life inſurance.

The "Britiſh Fire Office" inſures houſes and goods in the three claſſes above ſpecified at 2*s.*, 3*s.*, and 5*s. per cent. per annum* reſpectively.

The "Hope Fire and Life Inſurance Company" was inſtituted in 1807. Its annual rates of inſurance on the three claſſes above recited are, 2*s. per cent.*, 3*s. per cent.*, and 5*s. per cent.* on ſums not exceeding 10,000*l.*, 6000*l.*, and 3000*l.*, reſpectively. Farming ſtock is inſured at 2*s. per cent.* on a ſum not exceeding 10,000*l.* Special riſks may be inſured on terms correſponding to them. The following abatements are made upon country aſſurances, *viz.* 10 *per cent.* on policies for a ſingle year; 15 for three years; 20 for five years; 25 for ſeven years. Every perſon not being a proprietor of a ſhare or ſhares in the company, and who ſhall inſure or procure to be inſured, property to the amount of 1000*l.*, ſhall, upon the payment of 5*l.* beyond the premium of inſurance, be entitled, out of the profits (ariſing from fire inſurance only) to ſuch intereſt or dividend as may ariſe and become payable on one 50*l.* ſhare in the capital ſtock of the company; and ſo on in like manner for every additional 1000*l.* ſo inſured; and ſuch intereſt or dividend ſhall continue to be paid to ſuch perſon or perſons, or to his or their legal repreſentative or repreſentatives, during ſuch period as ſuch inſurances ſhall continue to be effected, and in the event of the ſame being diſcontinued, all dividends and intereſt, which may be then due or payable, together with the ſum of 5*l.* ſo paid for every 1000*l.* ſo inſured as aforeſaid, ſhall be forfeited and become the property of the company. Life inſurances are effected by this company on the ſame terms with thoſe of other offices. Perſons not being proprietors, who inſure, or procure to be inſured, 500*l.* upon their own lives, or lives of others, will, upon the payment of ten ſhillings *per cent.* (on the admiſſion of the party) beyond the premium paid for the inſurance, be entitled, out of the profits of the life fund, to ſuch intereſt or dividend as may be paid on a 50*l.* ſhare to the ſeveral proprietors thereof, and ſo on in like manner for every 500*l.* ſo inſured; but in no caſe whatever are they to be reſponſible for any claims which the life fund may be called upon to pay, the capital of the company being of a ſufficient magnitude for that purpoſe.

The "Eagle Inſurance Company" was inſtituted in 1807, for fire and life inſurance, and for granting annuities. Its capital is ſtated at two millions ſterling. The annual rates of inſurance againſt fire are as follows:

Annual Rates of Inſurance.

	s.	*d.*	
Common Inſurance, not exceeding 10,000*l.*	2	0	*per cent.*
Above	2	6	
Hazardous ditto, not exceeding 6000*l.* .	3	0	
Ditto, above	4	0	
Doubly hazardous, not exceeding 3000*l.*	5	0	
Ditto, above 3000*l.* and not exceeding 4000*l.*	6	0	
Ditto, above 4000*l.* and not exceeding 5000*l.*	7	6	

Farming Stock.

		s.	*d.*	
Without average clauſe,	for three months	1	3	*per cent.*
	for ſix months	1	6	
	for any longer period, not exceeding 12 months	2	0	

The building and ſtock of ſugar refiners, ſugar grinders, ſea biſcuit bakers, diſtillers, muſical inſtrument makers, cotton-ſpinners, calico printers, flax dreſſers, and other extraordinary riſks, may be inſured by ſpecial agreement.

Policies for ſhort periods, or leſs than a year, may be effected at conſiderably reduced premiums, and will pay only a proportionable part of the duty. The inſurance on lives is conducted as in other offices.

The "County Fire Office" was eſtabliſhed in 1807, for the expreſs benefit of country reſidents. The diſtinguiſhing principles of this inſtitution are, that its buſineſs conſiſts of a ſelection of the beſt riſks; that the perſons inſured become members; that all the members ſhare the profits equally, according to the ſums which they reſpectively contribute during ſeven years (whether their policies be taken out originally for ſeven years, or be renewed annually), and with the important advantage of not being liable to make good the loſſes of others, as a ſurplus capital of 400,000*l.* has been provided to meet any exceſs of loſſes that may occur. In common inſurances of 5000*l.* and under, in one riſk, the annual premium is 2*s. per cent.*; in hazardous inſurances, of 3000*l.* and under, in one riſk, 3*s. per cent.*, above 3000*l.* and under 5000*l.*, 4*s. per cent.*; in doubly hazardous inſurances, 3000*l.* and under, in one riſk, 5*s. per cent.*, above 3000*l.* and under 5000*l.*, 7*s. per cent.* Larger inſurances, according to the above deſcription of riſks, may be made by ſpecial agreement: and other inſurances againſt more hazardous riſks may be ſettled in the ſame manner. Hay, corn, and other agricultural ſtock, of whatever deſcription, on any part of a farm, may be inſured in one general ſum, at the reduced rate of 2*s. per cent.* without the average clauſe. Perſons inſuring for ſeven years will be charged only for ſix; and for any number of years more or leſs than ſeven, diſcount will be allowed both on the premium and duty. All the offices inſure againſt fire by lightning. It will be remembered, that a duty of 2*s.* 6*d. per cent. per annum*, on all property inſured from fire, is payable to government, under an act of the 44th of George III.

The "Atlas Aſſurance Company" was eſtabliſhed in 1808, and undertakes to aſſure the proprietors of buildings, merchandize, furniture, farming ſtock, goods and effects, and alſo of craft and ſhipping upon canals and in harbour, againſt loſs by fire; and alſo grant aſſurance upon lives. The capital is ſtated at one million two hundred thouſand pounds, of which the ſum of 120,000*l.*, inveſted in government or real ſecurities, will be applicable to the immediate purpoſes of the inſtitution; and the remainder guaranteed under a deed of ſettlement by a numerous and reſpectable proprietary.

Rates of Aſſurance per Annum.

Riſks.	Quality.	*Per Cent.*		On Sums not exceeding—	
		s.	*d.*	£.	
Firſt . . .	Not Hazardous	2	0	5000	Unleſs by Special Agreement.
Second . .	Hazardous	3	0		
Third . . .	Doubly Hazardous	5	0	3000	
Fourth . .	Farming Stock	2	0	5000	
Fifth . . .	Riſks, to which none of the above rates will apply.—Theſe may be aſſured by Special Agreement, on Terms as moderate as the nature of them will permit.				
	N. B. An additional premium of Sixpence *per cent.* will be required on buildings or goods within the Water-Side Diſtrict, for extra riſk.				

No charge is made for policies or indorſements on them: and for the encouragement of perſons making aſſurance for ſeven years by one payment, a deduction of one-ſeventh part of the premium and duty will be made; and if at the end of that period a further aſſurance of ſeven years be effected on the ſame property, a deduction of one-fifth part of the premium, and ſo on for ſucceeding years. The terms of life-aſſurances are much the ſame as thoſe of other offices.

A Table, exhibiting the Amount of the Duty on Inſurances for the Year 1810.

Total Amount 381,162*l.* 1*s.* 5*d.*													Property Inſured 304,929,650*l.*		
	Lady Day.			Midſummer.			Michaelmas.			Chriſtmas.			Total.		
	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*
Sun	27247	8	0	23144	9	10	20590	6	8	22885	12	4	93867	16	10
Phœnix	16241	5	2	12980	16	5	13875	5	2	14611	8	1	57709	4	10
Royal Exchange	10952	6	7	10012	15	0	11087	14	2	13014	17	1	45067	12	10
Imperial	9718	1	9	7638	9	9	8995	0	0	8995	3	0	35346	14	6
Globe	7980	16	5	5761	6	9	6678	18	9	6932	18	7	27353	10	6
Britiſh	4377	4	8	4198	17	2	4195	17	6	3923	6	1	16695	5	5
Hope	4327	15	2	3802	4	7	3266	12	6	4482	5	5	15878	17	8
Albion	4532	2	5	3804	13	4	3583	1	6	3763	11	8	15683	8	11
County	3645	2	11	2773	15	3	2718	2	3	4527	14	11	13664	15	4
Weſtminſter	3113	9	4	3145	8	2	2857	18	7	2939	17	9	12054	13	10
Hand in Hand	3161	15	5	2853	19	10	2698	12	3	2791	5	3	11505	12	9
Eagle	3133	8	6	2606	4	10	2919	17	9	2696	1	4	11355	12	8
Atlas	2120	15	11	2285	12	0	2606	5	7	2802	16	0	9815	9	6
London	1879	10	7	1608	11	6	3150	8	11	2674	6	1	9312	17	4
Union	1803	11	10	1395	15	2	1418	16	11	1229	14	9	5847	18	8

INTACTÆ, right lines to which curves do continually approach, and yet can never meet with them; more uſually called *aſymptotes*.

INTAGLIOS, precious ſtones, having the heads of great men, inſcriptions, and the like, engraven on them; ſuch as we frequently ſee ſet in rings, ſeals, &c.

IN-TAKER, a name anciently given to certain banditti, or free-booters, who inhabited part of the North of England, and made frequent incurſions into the very middle of Scotland; plundering the inhabitants wherever they came.

Thoſe who made the expeditions, were called *out-parters;* and thoſe who were left behind to receive the booty, *in-takers*. 9 Hen. V. c. 7.

INTAVOLARE, *Ital.* to write muſic for the lute and guitar in tablature, inſtead of muſical characters. See Tablature and Time-table.

INTAWA, in *Geography*, a town of Hindooſtan, in Bundelcund; 15 miles E. of Pannah.

INTEGERS, in *Arithmetic*, denote whole numbers; in contradiſtinction to fractions.

Integers may be defined to be, numbers which refer to unity, as a whole to a part.

INTEGRAL, or Integrant, is applied by the ſchoolmen to thoſe parts which are neceſſary to the integrity of a whole. In which ſenſe they ſtand contradiſtinguiſhed from *eſſential* parts.

Thus the arms, legs, &c. are integral parts; body and ſoul, eſſential parts of a man.

Integral *Calculus*, in the *New Analyſis*, is the counter part to the differential calculus.

This laſt has been completely explained by the marquis De l'Hoſpital; but the other ſtill remains imperfect, having been yet but little cultivated.

The integral calculus of Leibnitz, and other foreigners, anſwers to what the Engliſh call *inverſe method of fluxions*. See Fluxions, and Calculus.

INTEGRANT Parts, in *Philoſophy*, the ſimilar parts of a body, or parts of the ſame nature with the whole; as filings of iron are the integrant parts of iron, and have the ſame nature and properties with the bar they were filed off from. The chemiſts diſtinguiſh, in their reſolutions of bodies, between the dividing and reſolving them into integrant parts like theſe, and what they call conſtituent parts; that is, diſſimilar parts, or the principles of the bodies they work upon. Thus when crude mercury is diſſolved in aquafortis, though held imperceptibly in the menſtruum; yet when that menſtruum is diluted with water, and a copper-plate is ſuſpended in it, the menſtruum leaves the mercury, to work upon the copper, and the mercury ſubſides unaltered and in its own natural form; the mercury, therefore, in this operation, was only divided into its integrant parts, or ſmall parcels of the ſame nature and properties of the whole; but when artificial cinnabar is reſolved or divided into crude mercury and ſulphur, neither of theſe are of the ſame nature and properties with the cinnabar, and are not its integrant but its conſtituent parts. This therefore is the dividing a body into its conſtituent parts or principles.

INTEGRITY *of the Action*. See Action.

INTEGRUM Folium, among *Botaniſts*. See Leaf.

Integrum, *in reſtitutio*. See Restitution.

INTEGUMENTS, in *Anatomy*, the coverings of the body; the word is generally employed with the epithet *common*, as they are of the ſame nature and number in all parts of the frame. They conſiſt of the cuticle or epidermis, with its appendages the nails, of the rete mucoſum, and of the true ſkin, cutis, or dermis. The hair in its nature ſeems to reſemble the cuticle; but it grows from the cutis. To theſe three layers a fourth is ſometimes added, under the name of the *adipous membrane*. In truth, the ſkin is always connected to the ſubjacent organs by cellular tiſſue, the interſtices of which in moſt caſes contain fat, but not invariably ſo. This connecting ſtratum belongs entirely to the cellular organ. See Cellular *Subſtance*.

To the technical expreſſion of common integuments, the word ſkin correſponds in common language; but this term is often uſed by anatomiſts to denote the cutis, in oppoſition to the cuticula.

The three parts compoſing the integuments of the body are ſo different in their organization and functions, that we cannot approve the common arrangement, by which they are all conſidered together as forming one organic ſyſtem. We prefer the method of Bichat, who deſcribes the cutis, with the mucous layer on its ſurface, under the name of the *dermoid* ſyſtem; the cuticle with the nails under that of *epidermoid* ſyſtem; and the hairs under that of *hairy* ſyſtem (ſyſtème pileux). We ſhall employ this diviſion, and derive our account of the ſubject chiefly from the Anatomie Generale of that writer.

Dermoid Syſtem.—The ſurface of the body is covered in all animals by a more or leſs denſe membrane, generally proportioned in its thickneſs to the volume of the body, and ſerving the purpoſe of protecting the ſubjacent organs, of ſeparating a conſiderable portion of the reſidue of nutrition and digeſtion, and eſtabliſhing the relations between us and ſurrounding objects. In man it is the ſenſitive limit of his frame, placed at the extremity of his ſentient powers, inceſſantly expoſed to external impulſes, thus giving riſe to the relations of his animal life, and connecting his exiſtence to that of external objects. This covering is the ſkin or cutis.

Being every where proportioned to the external parts over which it is applied, it follows their chief inequalities, rendering the large projections very ſenſible, but concealing a great number of the ſmaller: hence the different appearances of the body in its entire and flayed ſtates. It is continuous throughout, and reflected at the different openings into the interior of the body, giving origin to the mucous ſyſtem. The limits of the two ſyſtems are conſtantly marked by a reddiſh line, the mucous being within, and the dermoid on the outſide of that boundary. The demarcation, however, is not ſo decided in the organization as in the colour; they appear to be inſenſibly blended. The dermoid ſyſtem becomes thinner in the neighbourhood of theſe openings, particularly about the face. At their commencement the mucous organ borrows more or leſs of the characters of the dermoid.

The external ſurface of the dermoid ſyſtem is every where contiguous to the epidermis, and is remarkable on account of the hairs implanted in it, of the oily matter which habitually covers it, of the ſweat which is depoſited on it, and of the ſenſe of touch reſiding in it. We ſhall diſregard theſe points at preſent, and confine ourſelves to the conſideration of the external forms of the ſyſtem.

Various kinds of folds are ſeen on the external ſurface.

1. Some depend on certain ſuperficial muſcles, which, adhering cloſely to the dermis, and almoſt conſolidated to its ſubſtance, throw it into wrinkles when they contract. Such are the wrinkles of the forehead produced by the epicranius; the radiated folds round the eyelids formed by the orbicularis; thoſe of the cheeks by the zygomatici and levator anguli oris; thoſe round the mouth when the lips are contracted by the orbicularis oris, &c. Theſe folds ariſe from the circumſtance that the ſkin cannot contract

as the muſcles do; and they are of the ſame nature with what we obſerve in mucous ſurfaces, particularly in the ſtomach, when the contiguous muſcular plane is contracted. Hence their direction is always perpendicular to that of the ſubjacent muſcles, whoſe fibres they cut at right angles. As the motions of theſe parts in the human countenance are much influenced by the paſſions, the wrinkles and irregularities in the face are highly important in a phyſiognomical point of view. The repeated actions of particular muſcles, under the habitual impreſſion of particular paſſions, produce permanent lines, which give the character of the individual.

2. Other wrinkles ariſe from the motions of parts, but not from thoſe of the ſubjacent muſcles: ſuch are thoſe of the palm and ſole. Here there is no ſub-cutaneous muſcle adhering to the ſkin, except the palmaris brevis, which has no ſhare in producing the folds, where the ſkin is habitually modified by the flexion of the organ. To this claſs belong the impreſſions at the articulations of the phalanges. In the palm there are three principal ones: at the baſis of the thumb, produced by the motion of oppoſition of that organ, at the front of the palm, by the flexion of the fingers, and in the middle of the palm. The cutis forms folds in theſe depreſſed lines when the palm is rendered hollow. Numerous other ſmall folds, correſponding to leſs marked and frequent motions, cut the former at various angles.

In the back of the foot and hand we obſerve numerous wrinkles at each articulation of the phalanges, when they are extended: they diſappear on flexion, and ariſe from the ſkin being looſer and more copious in theſe parts to accommodate the motions. There are analogous folds at moſt of the articulations, but they are leſs ſtrongly marked, becauſe the ſkin is leſs adherent to the neighbouring organs. Over the whole trunk, on the arm and fore-arm, the leg and thigh, no depreſſions are obſerved except thoſe produced by muſcular prominences.

3. A third kind of wrinkles, or rather of cutaneous impreſſions, which are very inconſiderable, occurs particularly in the ſole and palm, where they are eaſily diſtinguiſhed from the foregoing. They indicate the rows of papillæ: and nothing of the kind occurs on the ſurface of the trunk.

4. Laſtly, there are the wrinkles of old age, the nature of which is quite different. When the ſub-cutaneous fat has begun to diſappear, the ſkin is too large for the parts which it covers: it loſes its contractility by age, and cannot therefore accommodate itſelf to the altered bulk of parts. Thus, where there was moſt fat, as in the face, the wrinkles are moſt ſtrongly marked. When young perſons are ſuddenly emaciated, the ſkin contracts, and no wrinkles enſue.

The internal ſurface of the ſkin correſponds every where to the cellular tiſſue, which is looſe on the trunk, the thighs, arms, &c. and more denſe on the cranium, hand, &c. In moſt animals, a muſcular plane, named panniculus carnoſus, and analogous in its form to that which is every where connected to the mucous membranes in man, ſeparates the ſkin from the other organs, and imparts to it various motions. Traces of ſuch a ſtructure occur in a few inſtances in man, as in the latiſſimus colli, the epicranius, and the muſcles of the face.

The cellular tiſſue connects the cutis to muſcles almoſt univerſally in the trunk; but it has nothing to do with the motions of theſe muſcles, and receives from them no ſenſible influence. It is ſeparated from the muſcles in the limbs by aponeuroſes. Many veſſels purſue their courſe under it: large veins may be obſerved through its ſubſtance; numerous arterial ramifications are diſtributed on its ſurface; and nerves are found among theſe.

Organization of the Dermoid Syſtem.

1. *Proper Tiſſue of this Syſtem.*—This comprehends, 1ſt, the corion; 2dly, the rete mucoſum; and, 3dly, the papillæ or villi. The corion is the eſſential part, which determines the thickneſs and form of the ſkin: the rete mucoſum is not very diſtinct from it; and the papillæ manifeſtly grow out of it.

The corion is always white in the human ſubject. Its thickneſs varies conſiderably. In the head it poſſeſſes oppoſite characters on the cranium and the face: in the former it is very thick and denſe in its texture, in conſequence of the numerous hairs which traverſe it: in the latter it is every where thin and delicate, but more particularly in the eyelids and lips. On the poſterior part of the trunk, and eſpecially along the back, its thickneſs is nearly double that which it has in front, where it is nearly uniform in the neck, cheſt, and abdomen. We muſt except, however, the penis, ſcrotum, labia, and breaſts, where its texture is much thinner. The corion is nearly of equal thickneſs in the ſhoulder, arm, and fore-arm; in the hand its thickneſs is rather increaſed, and more ſo in the palm than on the back. It is generally much thicker on the thigh and leg, where there are more bulky muſcles than in the arm and fore-arm. It grows thicker in the foot, but leſs ſo in the dorſal than in the plantar region, which is the thickeſt part of the ſyſtem. The relation of its functions to the various degrees of thickneſs obſerved in the hand, foot, and cranium, may be eaſily underſtood; but in other parts we do not clearly ſee the reaſon of theſe differences.

It is generally thinner in women than in men, ſo as to preſent a ſenſible difference when the two are contraſted in any region of the body.

In order to examine the interior ſtructure of the corion, it ſhould be carefully ſeparated from the cellular and adipous tiſſue, to which the inner ſurface adheres more or leſs cloſely: we ſhall then find that ſurface differently diſpoſed in the different regions.

1. In the ſole and palm we ſee an infinite number of whitiſh fibres, ſhining like thoſe of an aponeurotic nature, detached from the inner ſurface of the ſkin, decuſſating each other in every direction, leaving, particularly towards the heel, numerous areolæ of different ſizes filled with fat, and gradually loſt in the ſub-cutaneous tiſſue. Hence there is not the ſame mobility of the ſkin over the covered parts, on theſe ſurfaces, as in moſt other ſituations; an arrangement well ſuited to the functions of prehenſion and ſupport belonging to theſe parts.

2. The cutis of other parts of the body has theſe fibres much leſs diſtinct, not interwoven with the cellular tiſſue, and ſeparated by ſmaller areolæ: hence it is much looſer, and more eaſily diſſected from the ſubjacent parts. The areolæ repreſent a vaſt number of openings placed irregularly by the ſide of each other, and lodging ſmall maſſes of fat: when theſe are carefully removed very ſenſible vacuities are left. The fibres, which form them, are ſufficiently cloſe to give the appearance of an uniform ſtructure perforated by numerous apertures. Theſe areolæ are very favourable to the action of the tanning principle, which is introduced through them to the corion much more effectually than it can penetrate on the oppoſite ſide. Bichat aſcertained this point by a direct experiment on the human ſkin. Chaptal has obſerved that the epidermis is a real obſtacle to the action of tanning, and that its removal, with that of the hair, is an eſſential preliminary for this reaſon; but that the hide, even when thus prepared, is affected much more eaſily on the inner than on the outer ſide.

3. On the back of the hand and foot, as well as on the forehead, the corion does not exhibit theſe numerous openings on its inner ſurface; it is ſmooth and whitiſh, particularly after being macerated a little: the ſame obſervation may be made concerning that of the ſcrotum, prepuce, and labia. Its tiſſue is more compact, and exhibits no intervals; ſo that although it is thinner than on the limbs and trunk, it contains nearly as much ſubſtance. In that, which correſponds to the hair and beard, we obſerve only the openings neceſſary for the tranſmiſſion of thoſe parts.

The three great modifications in the organization of the ſkin, which we have juſt deſcribed, are merely differences of form, and not in the eſſential nature of the organ. The areolæ may be ſeen in all parts, where they exiſt at all, by means of maceration, which is a very good method of examining the ſtructure of the ſkin. Immerſion in water ſoftens the ſkin by ſeparating the fibres of its corion, and rendering their intervals more diſtinct: we then find that the areolæ are not confined to the internal ſurface, but are prolonged into its ſubſtance, which is penetrated by them in its whole thickneſs. Theſe areolæ do not terminate in cul-de-ſacs towards the external ſurface, but they open on that ſurface by numerous holes very apparent in ſkin, which has been macerated for a month or two. The epidermis muſt be removed in order to render them ſenſible: they penetrate the ſkin obliquely, and admit in ſome parts and ſome ſubjects the introduction of a pin's head. They are ſimple communications from the interior to the exterior for the paſſage of hairs, exhalants, and abſorbents, as they come to the ſurface: thus the ſubjacent areolæ are merely cells containing the blood-veſſels, and the tiſſue of the ſkin altogether is a true cellular net-work, of which the interſtices are very diſtinct on the inſide, but leſs obvious externally. Thus the corion conſtitutes the baſis or ſkeleton of the cutaneous organ, lodging in its areolæ all the other parts of the organ, and giving to them their proper form.

Bichat conſiders that the areolar tiſſue, which compoſes the corion of the ſkin, has much analogy with that of the fibrous ſyſtem. Its denſity and reſiſtance are nearly the ſame in the heel: it becomes yellowiſh and tranſparent by boiling; it reſiſts maceration for a long time; and it receives in ſome ſituations the inſertion of muſcular fibres. Yet the ſenſibility and the diſeaſes of the two ſyſtems differ altogether.

The acute ſenſibility of this organ does not reſide in the areolar tiſſue of its inner ſurface, but in the part containing the papillæ. And we find that the ſame part is the ſeat of moſt cutaneous eruptions. The external ſurface only is coloured by the blood in eryſipelas; and hence ſlight preſſure, by driving this fluid into the deeper veſſels, removes the red colour. In meaſles, ſcarlet-fever, &c. the redneſs is alſo ſuperficial. Injections occaſion much greater redneſs of the external than of the internal ſurface; as the arterial trunks are found in the latter, and the numerous exhalants in the former. Theſe conſiderations prove clearly that the cellular tiſſue of the ſkin has much leſs vital activity than its outer ſurface; that this tiſſue is foreign to almoſt all the great phenomena occurring in the ſkin, particularly thoſe of ſenſation and circulation, which take place in the papillæ and the reticular body. Its functions, like thoſe of the fibrous ſyſtem, ſuppoſe it almoſt always in a paſſive ſtate, as they conſiſt merely in ſhielding the body, and protecting it againſt external agents. Its properties are well ſuited to this office of a general protecting medium. Very large weights are ſupported by ſlender ſtrips of ſkin, and dragging in any direction tears them with great difficulty. Yet this reſiſtance is ſtill much leſs than when the corion has been ſubmitted to the action of the tanning principle. After ſuch preparation it offers the ſtrongeſt connecting medium which we have in the arts: no other tiſſue in the animal economy, except the fibrous, unites in ſo remarkable a degree pliability and reſiſtance.

Haller, who regarded cellular ſubſtance as the principal component part of moſt organs of the human body, and particularly as forming the baſis of membranes, deſcribes the cutis as being made up of this tiſſue in a condenſed form. "Its ſtructure," ſays he, "is on the whole the ſame as that of membranes; *viz.* made of ſhort, intricate, and cloſely-adhering threads and laminæ. Its external ſurface is denſe; the internal is gradually reſolved into the cellular texture, ſo that there are no accurate limits between the two parts. Under maceration it ſwells and becomes looſened, and ſeparates into its component laminæ and fibres, both in man and animals." Elements Phyſiolog. t. v. p. 3.

The *rete mucoſum*, or reticular body of the ſkin, is ſo called from its ſuppoſed perforations by the papillæ and the hairs, and becauſe it appears of a ſoft mucous nature. It was firſt noticed by Malpighi, after whom it is ſometimes named rete Malpighii. The colour of the ſurface of the body ſeems to reſide entirely in this membrane: Riolan ſaid that the cauſe of the black colour in the negro is in the epidermis, and does not go ſo deep as the true ſkin. Malpighi, by ſhewing the diſtinction between the cuticle and rete mucoſum, demonſtrated the true ſeat of the colour of the body. "Ex quo," ſays he, "deduco non incongruam forte nigredinis Æthiopum cauſam: certum enim eſt ipſis cutam albam eſſe ſicuti et cuticulam, unde tota nigredo a ſubjecto mucoſo et reticulari corpore ortum trahit."

The rete mucoſum in the negro is a thin black layer, about as thick as the cuticle itſelf. Putrefaction eaſily detaches it with the cuticle from the cutis; but it can hardly be ſeparated from the former. It diſſolves in water, and communicates a turbid cloud to it, like that produced by the pigmentum nigrum. Mr. Cruikſhank deſcribes it as being "double, and conſiſting of a grey tranſparent membrane, and of a black web, very much reſembling the nigrum pigmentum of the eye." The demonſtration of this reticular body is much leſs eaſy in the white races than in the negro; and indeed very little ſeems to be known concerning its anatomy in the former. "Moſt authors," ſays Bichat, "repreſent the rete mucoſum as a mucous ſtratum interpoſed between the cutis and epidermis, and pierced by a large number of openings for the paſſage of papillæ: but I do not underſtand how this can be demonſtrated on detaching the cuticle, if it be fluid according to the uſual deſcription. I have employed, for diſcovering it, ſeveral means, none of which has ſucceeded. So cloſely does the cuticle adhere to the cutis, that they cannot be ſeparated without injuring one or the other in the recent ſtate. Yet, if we ſucceed in an attempt of this kind, there is no appearance of mucus on the corion. After a longitudinal ſection, particularly in the foot, where the epidermis is very thick, the line of diſtinction between it and the corion is very manifeſt: but nothing eſcapes from between them. When the cuticle has been removed, after boiling the ſkin, nothing remains on either of the ſurfaces. Maceration and putrefaction, but particularly the latter, produce a kind of viſcid covering on the ſkin, very obvious when the epidermis is detached: but this is produced by decompoſition, and nothing of the kind is ſeen under ordinary circumſtances. I believe, from all theſe conſiderations, that there is no ſubſtance depoſited by the veſſels on the ſurface of the cutis, and forming an exterior covering in the ſenſe in which Malpighi has repreſented the matter. I think we ſhould underſtand, by the reticular body, an inter-texture of extremely fine veſſels, the trunks of which, already very minute, after paſſing through the numerous perforations of the corion, are ramified on its ſurface, and contain different kinds of fluids. The exiſtence of this vaſcular net-work is placed out of all doubt by minute injections, which entirely change the colour of the ſkin on the outſide, without altering it much internally. This is the principal ſeat of the various eruptive diſorders, moſt of which are altogether foreign to the corion.

"We may then conceive the reticular body as a general capillary ſyſtem, ſurrounding the cutaneous organ, and forming, with the papillæ, a ſtratum intermediate to the corion and epidermis. In the white part of the human race this ſyſtem contains only white fluids; in the negro they are black, and of various tints in the other varieties of our ſpecies. The enumeration of the different ſhades of this organ, and the conſideration of the cauſes of theſe varieties, belong to the natural hiſtory of man. Hitherto we have very few data concerning this ſubſtance: it does not ſeem to circulate in the part. We ſee that the negro's ſkin is black, and we know very little more. The rete ſometimes adheres to the cutis, but generally to the cuticle, when they are ſeparated after maceration. It is manifeſtly foreign to both, ſince they have the ſame colour in the dark as the white races."

It ſeems really to be a matter of doubt, whether in the white races there be any colouring-matter in the exterior capillary ſyſtem analogous to the black ſubſtance of the negro, or whether the colour of their ſurface ariſe merely from that of the cutis and cuticle. That there is ſome colouring-matter is rendered probable by the ſingular anomaly exhibited in the *albinos*; which ſee. We can demonſtrate in that caſe the abſence of the pigmentum nigrum of the eye, and we ſee clearly the deficiency of colour in the hair. The peculiar dead white of the ſkin is referred, by analogy, to the want of the colouring principle in that organ. There is generally a connection between the colour of the ſkin, hair, and eyes, which is remarkably evinced in this inſtance. A dark complexion is accompanied with black hair and dark eyes; and the light irides, as the blue and grey, occur in individuals with red, flaxen, or other light ſhades of the hair and light ſkin. All theſe circumſtances lead us to conclude that the ſkin, hair, and eyes have their colour dependent on ſome peculiar matter, the tint of which follows a general law in all theſe parts.

Even in the white races certain portions of the ſkin ſometimes exhibit a dark colour. The areola round the nipple becomes black or dark brown in women who are ſomewhat advanced in pregnancy, and affords a very ſure mark that they are pregnant. Haller ſays that he ſaw the ſkin of the pubes in a woman approaching nearly to that of the negro in blackneſs; and Albinus mentions a ſimilar circumſtance in a man.

The colour of the ſkin is tranſmitted to the offspring, and is ſurpriſingly altered by intermarriages of the different races. Where a black and a white individual copulate, the offspring has the middle tint between thoſe of its parents. If the child of a black man ſhould intermarry with a white perſon, and their child with another white individual, and ſo on, the offspring will be white in the fourth generation; or *vice verſâ*. But the detailed conſideration of this ſubject belongs, more properly, to natural hiſtory.

The colour of the cutaneous organ in the white races of the human ſpecies is much modified by accidental circumſtances. Expoſure to the ſun's rays produces various ſhades of a reddiſh-brown colour, which effect is commonly called tanning: this alteration is very rapidly produced by going much on the water, in conſequence of the reflection of the light from its ſurface. That this is the conſequence of the cauſe juſt aſſigned, and that the effect is not produced by heat, is rendered obvious by the difference of colour in the face and hands, and on thoſe parts of the body which are habitually covered: alſo by the brown tint of the face produced by a ſummer's ſun, which offers a remarkable contraſt to that of the forehead, where it is protected by the hat. Our clothes do not prevent the action of heat upon the ſkin, but will intercept the luminous rays. The pale and ſallow tints of the inhabitants of large towns, compared to the florid countenances of country people, ariſe from the ſame cauſe. Men are blanched like plants when ſhut out from the influence of the ſun. Tanning takes place much more quickly in individuals of light complexion, than in thoſe of an oppoſite character. The effect in all caſes is temporary, and goes off when the cauſe no longer acts. It is produced in a greater and more permanent degree in white individuals who move into warm climates: but neither here nor in any other inſtance is it tranſmitted to the offspring. Phyſiologiſts have choſen to repreſent this as a change occurring in the rete mucoſum; on what authority we do not know. The light brown ſpots, called freckles, which occur about the head and neck when expoſed to ſun and air, ſeem to be of the ſame nature with the tanning. The colours impreſſed on the ſkin in the operation of tattowing, reſide in the cutis, and conſequently remain when the cuticle and rete mucoſum have been deſtroyed by maceration. Theſe colours are permanent: they remain through life, and the marks can only be deſtroyed by removing the ſkin which contains them; a circumſtance which is hardly reconcileable to our notions of the conſtant changes of decompoſition and compoſition in all parts of the frame.

Mr. Cruikſhank deſcribes a vaſcular membrane as exiſting between the rete mucoſum and cutis; and apparently it is the ſame as the vaſcular net-work of Bichat. He injected this in the ſkin of perſons who had died of ſmall-pox; and was led to inveſtigate the matter from a converſation with a gentleman who conceived that he had injected veſſels in the rete mucoſum. He macerated in putrid water, during the ſummer, portions of ſmall-pox ſkin, which had been kept for ſome time in ſpirits. "Cuticle and rete mucoſum were already turned down; and upon the eighth or ninth day I found I could now ſeparate a vaſcular membrane from the cutis, in which were alſo ſituated the injected ſmall-pox puſtules. Theſe laſt conſiſted of circles of long-floating villi at the circumference, but of a white uninjected ſubſtance in the centre. This central part Mr. Hunter had previouſly ſaid was a ſlough formed by the irritation of the variolous matter. The ſurface of the ſkin, from whence this membrane was ſeparated, was elegantly porous. The pores now appeared exceedingly more numerous, and this ſurface of the ſkin was ſtill tough and ſhining. I macerated the ſame ſkin for four or five days more, and ſeparated another membrane, more delicate than the former, but alſo vaſcular. The former I eaſily preſerved; the latter, attracted by the inſtrument that ſeparated it, or unable to bear the agitation of the water or ſpirits in which it was ſeparated, conſtantly broke down. But the correſponding ſurface of the ſkin was ſtill tough and ſhining; the pores were now much larger and more diſtinct than before, and convinced me that the appearance was natural, and that the ſkin had ſuſtained no real injury in the proceſs." Experiments on the inſenſible Perſpiration of the Human Body, &c. p. 38.

It has generally been ſtated that the rete mucoſum is not regenerated when it has been deſtroyed in ulcers; and conſequently that the cicatrices of blacks are always white. We believe that this point is not clearly proved.

Whatever opinion we may form concerning the different ſtrata deſcribed above, as intervening between the cuticle and cutis, whether we regard them as diſtinct membranes, or as portions detached by art from the cutis, they are of importance, as containing an extenſive diſtribution of capillary veſſels. Independently of the colouring matter, theſe veſſels ſeem ordinarily to be filled with white fluids: the exhaling pores, which furniſh the matter of perſpiration, ariſe from them, and the ſame vaſcular net-work is the ſeat of eryſipelas, and of all the cutaneous eruptions which do not affect the corion.

"The blood," ſays Bichat, "does not penetrate this capillary ſyſtem in the ordinary ſtate: but numerous cauſes will lead to its being ſuddenly diſtended. Rub the ſkin a little roughly, and it is inſtantly reddened. Irritate it mechanically or chemically, its ſenſibility is immediately awakened, it becomes filled with blood, which could not enter before, and is reddened in a ſurface proportioned to the extent of the irritation. The cheeks exhibit an analogous phenomenon in bluſhing; and all rubefacient membranes ſhew the great tendency of the ſuperficial capillary ſyſtem to admit, under circumſtances of excitation, that blood which it rejects in its natural ſtate. Bliſters, and fire, applied to a degree ſhort of deſtroying the ſurface, act in the ſame way: they cauſe a ſudden ſpecies of eryſipelas, which is followed by an abundant ſerous exhalation under the cuticle.

"Irritation of the ſkin is not the only cauſe which determines an influx of blood into the exterior capillary ſyſtem. Whenever the action of the heart is accelerated, and the motion of the blood conſequently precipitated, there is a tendency to this paſſage, as we ſee clearly after violent exerciſe, or on the acceſs of the hot ſtage in fevers.

"The capillary ſyſtem of the face is more ſubject to this ſudden influx of blood than that of any other part. This is ſeen in the two caſes juſt mentioned, of exerciſe and fever, where the action of the heart is accelerated. In various diſeaſes of internal organs the facial capillaries are ſympathetically affected, and produce redneſs or paleneſs of the countenance; and their diſtention always gives to the face in aſphyxia a livid tint, which is confined to that part. In deaths reſembling aſphyxia, where the circulation becomes embarraſſed in the lungs, and in apoplexy, the head is equally remarkable for its lividity. Three circumſtances may be noticed, in explanation of this great ſuſceptibility of the facial capillary ſyſtem for the admiſſion of blood; 1ſt, the ordinary redneſs of the cheeks ſhews that blood is habitually contained in theſe capillaries in a certain quantity, which is not the caſe in other parts; 2dly, anatomical injections ſhew us that the arteries communicate here more freely with the capillaries; fine injections colour the face much more deeply than other parts; and, 3dly, there is a more acute ſenſibility in the face; a ſlight blow will bring the blood into the cheeks in an inſtant, although it would produce no redneſs in the arm.

"The blood quits the capillaries of the face as quickly as it enters them; the paſſions produce here, almoſt in inſtantaneous ſucceſſion, the lively red of a febrile attack, the deadly paleneſs of ſyncope, or any intermediate ſhades. Thus the face becomes well adapted to ſerve as a kind of ſcene, painted ſucceſſively by the paſſions with numerous ſhades, which are effaced, return, and undergo a thouſand modifications according to the ſtate of the mind.

Let me obſerve further on this ſubject, that the paſſions have a threefold mode of expreſſion in the countenance; 1ſt, by the capillaries which, being altogether involuntary, often betrays what we ſhould be inclined to conceal; 2dly, the muſcular motions, which contract or expand the features to expreſs the ſad or the joyful affections, and thus produce the wrinkles already noticed; and, 3dly, the eye, which, as Buffon obſerves, not only receives ſenſitive impreſſions, but alſo expreſſes mental emotion. The two latter are in ſome degree voluntary; we can feign them, although we cannot deceive with the firſt.

"The tendency of the facial capillaries to become diſtended with blood, diſpoſes them to numerous morbid affections. Eryſipelas frequently attacks this part; variolous puſtules are particularly active here; and ſeveral eruptions occur more frequently in the face than in other ſituations.

"We muſt therefore diſtinguiſh two parts in the capillary ſyſtem exterior to the corion. One contains habitually the colouring matter of the ſkin, which is at reſt, or experiences at leaſt no other motion, than the flow and almoſt inſenſible one of compoſition and decompoſition, and which therefore never exhibits ſuch ſudden changes as we have juſt deſcribed. Though the other fluids are habitually circulated, and are conſtantly eſcaping by tranſpiration; their place is often ſupplied by blood. We know of no communication between theſe; they appear to be abſolutely independent. Some white fluids remain in the latter part at the time of death, as the following experiment will prove. Immerſe a piece of ſkin in boiling water for a ſhort time, and the epidermis will be elevated into numerous ſmall veſicles containing a ſerous fluid."

The *papillæ* of the ſkin are ſmall eminences of its external ſurface, ſuppoſed to perforate the reticular body, and conſequently to be contiguous by their extremities to the epidermis; they differ in form in various ſituations, and are called villi where they are ſmall and fine. Malpighi firſt obſerved in animals, and particularly in the foot of the pig, that the external ſurface of the ſkin is not level, but elevated into certain prominences under the cuticle. This ſtructure does not belong to the whole ſurface of the cutaneous organ, which, although rather unequal in conſequence of ſmall riſings about the hairs, has no regularly arranged parts deſerving to be called papillæ. Thus Ruyſch could find nothing of this kind on the back of the foot, and acknowledges that they are obſcure in other parts, and only to be ſeen after injections; and other anatomiſts have experienced conſiderable difficulty in detecting theſe parts, even with the aſſiſtance of glaſſes.

"Neither," ſays Bichat, "are we to miſtake for papillæ the numerous and very ſenſible tubercles, which make the ſkin of certain ſubjects very rough. Theſe conſiſt of ſmall cellular and vaſcular faſciculi, or of ſebaceous glands found at the openings of the corion under the epidermis, through which the hairs are tranſmitted; elevate the external ſurface, and thus cauſe projections. Maceration for two or three months converts theſe bodies, which always contain a little fat, into the firm, whitiſh, unctuous and ſpermaceti-like ſubſtance always produced from adipous matter by maceration; the ſkin at the ſame time becomes ſoft and pulpy, and is looſened round theſe tubercles, which are clearly ſeen to be continuous with the ſubjacent fat. Theſe prominences are more frequent on the limbs and back than on the front of the trunk; and they are more numerous in the former, on the aſpect of extenſion than of flexion. The abſence of theſe riſings, and a conſequent ſmoothneſs of the outer ſurface of the corion, belong to our notion of a beautiful ſkin; and this character belongs much more to the cutaneous organ of women than of men. The epidermis covering theſe prominences is often detached in ſcales, particularly by any rather ſtrong rubbing; and this contributes ſtill more to the roughneſs and harſhneſs of the ſkin; it might lead us to ſuppoſe that the epidermis forms them, although it is only acceſſary. Where the latter is thick, as in the palms and ſoles, theſe cutaneous tubercles are never ſeen."

The proper papillæ of the ſkin are very viſible in the hands and feet, and may be ſeen when the cuticle has been carefully removed after ſimple maceration for a ſufficient time; but ſtill more plainly when the cutis has been minutely injected previous to the macerating proceſs. We obſerve narrow, longitudinal, and ſlightly prominent lines in the cutis, diſtributed ſpirally at the ends of the fingers and toes. From theſe ridges ariſe very ſmall conical proceſſes like fine threads or hairs, ſlightly inclined towards the nail, ſhorter and more imperfect in the ſmaller toes and fingers; they give a rough villous appearance to the ſurface, which is repreſented in the ſeventh figure of Mr. Cruikſhank's work on the inſenſible perſpiration. They are very diſtinct in the red part of the lips, where they are numerous and long, and produce a villous appearance; Ruyſch has figured them in his eighth Theſaurus. The ſoft and ſpongy ſkin of the glans penis is remarkable for a ſimilar ſtructure, which is well repreſented by Albinus in the Annot. Acad. lib. iii. tab. 4. They are more obtuſe in the female mammæ. The minuteneſs of theſe organs renders it difficult to aſcertain their internal ſtructure ſatisfactorily. They receive numerous blood-veſſels, ſo as to become much more deeply tinged by coloured injections than the ſurrounding ſkin. They receive numerous nerves, and have generally been regarded by anatomiſts in a particular manner as organs of a nervous ſtructure. That a conſiderable ſupply of nerves is beſtowed on thoſe parts of the ſkin which have theſe papillæ is very clear; but, that the minute filaments can be traced into the very prominences, and that they lay aſide their coverings, ſo that the nervous pulp is bare in them, muſt be regarded as inferences from analogy rather than from direct obſervation. The denſity of the corion, and the extreme ſlenderneſs of the nervous threads, are almoſt inſuperable obſtacles to our tracing the nerves into the papillæ.

We can ſcarcely doubt, ſays Haller, that theſe bodies are the organs of touch, when we obſerve them larger, more diſtinct, and receiving a greater ſupply of nerves where this ſenſe exiſts in the moſt acute degree, hardly diſcernible in other ſituations; and particularly calculated by their prominence to be impreſſed by external objects. Perhaps their exiſtence in the ſole of the foot, where they are covered by ſo thick a cuticle, is hardly reconcileable with this opinion.

That the veſſels, which they contain, contribute to the ſeparation of the matter of perſpiration, is ſo conformable to general analogy, that we can eaſily admit it. Mr. Cruikſhank was diſpoſed to regard them as the organs of cutaneous abſorption from their reſemblance to the inteſtinal villi, on which he diſcovered the orifices of the lacteals.

Effect of various Agents on the Dermoid Tiſſue.—We have noticed already, under the head of the rete mucoſum, the action of light upon the living ſkin.

The action of caloric on the living integuments preſents different phenomena, according to the degree in which it is applied. A warm atmoſphere relaxes its tiſſue, increaſes its action, and promotes the evacuation by the exhalants of the reſidual fluid of nutrition and digeſtion. It is contracted and corrugated by cold, and refuſes to admit theſe fluids, which then go off chiefly by urine. The gradual change from one to the other of theſe ſtates does not produce any unpleaſant effect: but ſudden viciſſitudes are not ſo free from danger. The cold produced by the evaporation of the cutaneous exhalation, enables the human ſubject to preſerve his ordinary temperature in air, heated above the degree of boiling water. See the very curious facts on this ſubject detailed in the article HEAT, *Animal*. The interruption of the cutaneous diſcharge on the corrugation produced by cold ſuſpends this evaporation, and thereby prevents the temperature from being lowered beyond the natural ſtandard.

When more conſiderable heat is applied to the ſkin, it produces firſt a ſenſible redneſs, which is followed by veſications. If it be increaſed in degree, the texture of the organ is deſtroyed; it is hardened and curled up, like any other animal tiſſue when burnt; beyond this point it is blackened and converted into a coal. The firſt operation is on the vital powers of the organ, and conſequently can take place only during life: the latter effects are produced on the tiſſue, and may be exhibited in dead ſkin. The latter, when heated, contracts, and then ſwells, exhales a fetid odour, and leaves a denſe charcoal, difficult to incinerate. On diſtillation it yields the ſame products as fibrine. Intenſe cold produces in the firſt place a redneſs of the organ, as in the noſe, ears, fingers, &c. of individuals expoſed in a very cold climate: inflammatory action and mortification enſue. The latter occurs immediately on the application of high temperature, but after ſome interval in the oppoſite caſe.

The air evaporates and carries off habitually the matters ſecreted from the ſkin: and when this effect is not produced, they are accumulated on the ſurface, and render it moiſt. This evaporation is a phyſical phenomenon entirely diſtinct from the vital action of tranſpiration. The latter takes place in a warm bath, as well as in the air; but in the former caſe the fluid is diſſolved by the water. Does free expoſure of the ſkin to air increaſe or diminiſh the amount of its exhalation? The common opinion ſeems to be that the latter effect is produced; the exhaling pores are ſuppoſed to be obſtructed by the impreſſion of cold on the ſkin. Dr. Stark, however, proved by direct experiment in his own perſon, that the body loſt more weight in a given time when naked, than when covered by the ordinary clothing.

Moiſture of the ſkin may be produced in two perfectly diſtinct ways; 1ſt, by increaſed exhalation, which may ariſe from accelerated action of the heart, as in violent exerciſe or fever; from relaxation of the organ by the warmth of the air, or by baths; or from ſympathy, as in conſumption, fear, &c. Under all theſe circumſtances the increaſed diſcharge will keep the ſkin moiſt. 2dly. The ſame effect will be produced by inſufficient diſſolution of the perſpiration when it is produced, as in bed, or in damp weather.

When the air has acceſs to dead ſkin on all ſides, it is dried, and becomes tranſparent, unleſs it ſhould contain blood; it is then firm, but admits of being bent. In this ſtate it yields very little to external agents, does not readily abſorb moiſture, and has no diſagreeable ſmell. Hence ſkins ſimply dried are of great uſe in the arts, and afford ſerviceable and pleaſant coverings; hence, too, probably the great durability of the mummies.

If the ſkin be left on the body, or expoſed in moiſt air, it putrefies, aſſuming ſucceſſively a brown, a greeniſh, and laſtly ſomewhat black colour. It exhales a moſt fetid odour, and becomes ſwollen by the liberation of gas. A fluid mucus appears on its ſurface, from which the epidermis is then ſeparated. When all the fluids are evaporated, a blackiſh ſubſtance remains.

Water removes from the living ſkin thoſe parts of the perſpired matter which are not diſſolved by the air; and the uſe of bathing, which is much neglected in theſe days, muſt be regarded as an efficacious means of preſerving the ſurface free from acrid and irritating matters, and conſequently in a ſtate of health. We cannot ſtate preciſely what action baths have on the living ſkin; we are told indeed that they relax and ſoften, or conſtringe and brace; but no preciſe meaning is attached to theſe vague expreſſions. They ſeem to affect the vital powers of the part, to augment or diminiſh them, but we know of no influence on the tiſſue.

After macerating the ſkin for ſome hours in water, with agitation and preſſure, evaporation of the fluid yields a little gelatine. When macerated longer it becomes ſoftened, and ſenſibly whiter, ſwells a little, and remains for a long time without undergoing any other alteration than a degree of putrefaction, much leſs than what occurs in the muſcular, glandular, and other tiſſues. This putrefaction is more marked on the ſurface in contact with the cuticle, but at the end of two months the ſkin has loſt but little of its conſiſtence; it begins to be reduced into a fetid pulp at the end of three or four months. According to Fourcroy, ſpontaneous decompoſition in water or moiſt earth converts it into a fatty matter, and into ammonia, which compoſe a kind of ſoap. It produces very little froth when boiled. Juſt before ebullition commences, ſo as always to be convex on the ſide covered by the epidermis, and concave on the oppoſite; the fibres are contracted and condenſed at this time, and the contraction is greater on the inner ſurface, where the intervals are the largeſt. At the ſame period ſmall veſications are obſerved. This criſpation of the ſkin renders it denſe, hard, and elaſtic, but reduces its dimenſions. It ſoon acquires a ſemi-tranſparency and yellowiſh colour, like that of the fibrous organs when boiled. The hardneſs which it had acquired at the inſtant of criſpation is now gradually loſt; the ſkin is ſoftened, yields much gelatine to the water in which it is boiled, but inſtead of diminiſhing, is rather increaſed in thickneſs. All appearance of fibres is loſt in this ſtage; a ſemi-tranſparent, gelatinous, and homogeneous maſs remains; ſtill it does not loſe its elaſticity; probably the large quantity of gelatine, which it contains, occaſions it to retain this property. The ſlighteſt motion excites in it a general vibration as in the different animal jellies. By a continuance of the boiling nearly the whole gelatine is diſſolved, conſtituting a viſcid liquor, which by proper evaporation is converted into glue; and a ſmall membranous reſidue only, which is diſſolved with great difficulty, remains; a long time is required to reduce the ſkin to this ſtate. From this ſolubility in water, the cutis of animals is moſtly employed in the manufacture of glue.

Sulphuric, nitric, and muriatic acids act on the ſkin, as on any other animal ſubſtances, but much more ſlowly, particularly on the ſurface covered by the epidermis. The firſt reduces it quickly to a blackiſh pulp; the two others, even in a concentrated ſtate, bring it leſs readily into a pulp: the oxymuriatic acid produces very little effect on it. Nitric acid converts it into oxalic acid and fat, while, at the ſame time, azotic gas and pruſſic acid are emitted. Acids do not act in this way during life: they never produce this pulpy ſtate of the organ. A piece of cauſtic, enveloped in a portion of ſkin, is reduced to a yellowiſh-red thick fluid in the courſe of a day: the ſkin is criſped and contracted, but not penetrated; its tiſſue does not even appear injured on the ſurface. Alkalies have different effects, according to circumſtances, in the living ſtate; they deſtroy ſome granulations much more readily than others. An alkaline lixivium, applied to the ſurface of the body, cauſes an unctuous and ſlippery feel, as its combination with the unctuous matter produces a ſoap. Concentrated alkalies diſſolve the dead ſkin, converting it into oil and ammonia.

"The cutis," ſays Dr. Thomſon, "appears to be a peculiar modification of gelatine enabled to reſiſt the action of water, partly by the compactneſs of its texture, and partly by the viſcidity of the gelatine, of which it is formed; for thoſe ſkins which diſſolve the moſt readily in boiling water, afford the worſt glue. Mr. Hatchett has obſerved that the viſcidity of the gelatine obtained from ſkins is nearly inverſely as their flexibility, the ſuppleſt hides always yielding the weakeſt glue; but this glue is very ſoon obtained from them by hot water." Syſtem of Chemiſtry, v. 5. p. 575.

The production of leather, by the action of the tanning principle of vegetables upon the ſkin, is a ſubject of ſuch importance, that it would be uſeleſs for us to enter on it here: it will be conſidered ſeparately in the articles of the dictionary relating to tanning: further information on the chemical properties of the ſkin may alſo be derived under the heads GELATIN, GLUE, &c.

Very little is known of the chemical conſtitution of the rete mucoſum. Oxymuriatic acid deprives it of the black colour, and renders it yellow in the negro. Beddoes ſtates that immerſion for ſome time in water, impregnated with that acid, will diſcharge the colour in the living ſubject. (On Factitious Airs, p. 45.) Fourcroy mentions that the foot of a negro, after a ſimilar expoſure, nearly loſt its colour, but that the original black hue returned in a few days. Syſt. des Connoiſſ. Chimiques, t. ix. p. 259.

Common Parts belonging to the Tiſſue of the Dermoid Syſtem.—The ſkin contains a large proportion of cellular ſubſtance. Numerous prolongations of the ſubcutaneous cellular ſtratum penetrate the contiguous areolæ of the corion, then paſs into the more exterior ones, and end at the numerous pores which tranſmit the veſſels, nerves, and hairs. Thus, if the cellular tiſſue could be completely ſeparated, the cutaneous organ would repreſent a piece of ſponge, being perforated in every direction. According to Bichat, boils perform this diſſection, deſtroy the cellular organ, and leave the ſkin in this cribriform ſtate. He adds, that the corion itſelf is not the ſeat of any acute affection: that all diſeaſes of this nature either affect its ſurface, or the cellular tiſſue of its areolæ. But it may be altered by chronic diſeaſes; and is manifeſtly diſorganized in elephantiaſis.

In anaſarca of long continuance the ſubcutaneous ſeroſity gradually penetrates the cellular ſubſtance of the dermoid areolæ, ſeparates its fibres, and ſometimes arrives even at the epidermis, which it burſts; through theſe openings it eſcapes.

Probably, ſays Bichat, the cellular tiſſue does not extend ſo far as the external ſurface, under the epidermis: for when that covering is removed, no granulations are formed, although theſe are always produced whenever cellular tiſſue is expoſed.

The arteries, running in the ſubcutaneous cellular ſubſtance, furniſh an infinite number of ſmall branches, which enter the areolæ of the ſkin with the cellular prolongations, anaſtomoſe at every point in the areolæ of the organ, and penetrate at laſt through the pores of the exernal ſurface to produce the capillary net-work already deſcribed, which, in the ordinary ſtate, contains very little red blood. In this paſſage, through the areolæ of the ſkin, very few branches ſeem to terminate on the fibres of the corion itſelf.

After penetrating the ſkin in the oppoſite direction, the veins opens into the large ſubcutaneous trunks, which in many parts may be ſo clearly ſeen through the integuments. The venous ramifications of the areolæ are nearly inſenſible in the natural ſtate, but are conſiderably dilated over cancerous tumours, ſo that the ſkin is marked by numerous blueiſh ſerpentine lines. All gradual extenſions of the cutaneous organ, as in aneuriſms, pregnancy, dropſy, &c. are attended with the ſame phenomenon, which is never exhibited in acute caſes.

Numerous and conſiderable branches of nerves form a kind of ſubcutaneous nervous ſyſtem, producing the filaments which enter the ſkin. They communicate with each other in traverſing the areolæ of the organ, and probably terminate on the papillæ. In the hand, where theſe prominences are very numerous and clearly marked, there are more ſubcutaneous nerves, in proportion to the ſurface, than in any other part.

A great number of abſorbing veſſels is found under the ſkin; inſomuch, indeed, that this is the moſt favourable ſituation for inveſtigating them. The veins are ſurrounded by them, and ſeveral faſciculi are obſerved in the intervals of theſe veſſels; ſo that we may repreſent the ſkin and aponeuroſes as being ſeparated, in the limbs, by a continuous ſtratum of theſe veſſels. We muſt refer the origin of many of them to the corion, from the areolæ of which they carry into the blood the fat and cellular lymph, as well as the nutritive matter of its fibres. But is there, moreover, a particular order of branches opening on the epidemis, for the purpoſe of abſorbing ſubſtances from the ſurface of the body under certain circumſtances? Anatomical inveſtigations do not enable us to decide this queſtion directly: the abſorbing pores cannot be demonſtrated: we muſt therefore inquire whether the phenomena of the cutaneous functions indicate their exiſtence. We may obſerve, previouſly, that the ſuperficial abſorbents are very numerous, and ſeem to be in greater number than would be required for abſorbing the contents of the cellular ſubſtance.

It had long been received as an eſtabliſhed truth, that the ſkin is an inhaling or abſorbing, as well as an exhaling organ; that though the loſs by perſpiration commonly greatly exceeds what the ſyſtem gains by abſorption, yet ſometimes, according to the varying circumſtances of external relations and conditions of the body itſelf, the inhalation balanced, and even ſurpaſſed the exhalation. Of late this doctrine of inhalation has been called in queſtion, and, in the opinion of many, has been completely overthrown.

The moſt direct argument in favour of abſorption from the ſkin, is the action of various ſubſtances upon the body, when applied to this organ. This is ſhewn in a particularly clear view in the inſtances of opium and mercury. Dr. Currie (Medical Reports, chap. 19.) conſiders, that in all ſuch caſes the article abſorbed is forced through the epidermis by mechanical preſſure; or that the epidermis has been previouſly deſtroyed by injury or diſeaſe; or if ſound, that the article applied to it is of an acrid nature, which firſt irritates and erodes this tegument; and then coming into contact with the mouths of the lymphatics under it, is of courſe abſorbed. This explanation is quite unſatisfactory. The firm adheſion of the cuticle and cutis is well known: on the ſuppoſition juſt mentioned they ought to be ſeparated, which is not the fact, we ought to ſee the ointment under the cuticle, which is equally untrue, and the ointment ſhould penetrate equally in the dead ſubject, which is not the caſe. However, the action of mercurial fumigations, where no friction is employed, affords a caſe of abſorption from the ſurface of the ſound cuticle, which cannot be denied.

On the ſame ſide of the queſtion, it has been aſſerted, that water is taken up by the ſkin in various caſes. Many inſtances have been known of perſons at ſea, with no freſh water, having their thirſt much allayed by wetting their cloths with the ſalt water. Haller affirms, too, on the authority of Deſault, that the body acquires an increaſe of weight in the warm bath: "denique vapor aquæ calidæ in manum reſorbetur, et homini in balneo conſtituto cutis tumet et rubet, corpus pondere augetur, ſitis ſedatur, et omnia ſigna eduntur aquæ reſorbtæ et ſanguini admiſtæ." t. v. p. 88. Experiments have ſince been made with every neceſſary care, which ſeem to contradict this poſition, and to prove that the body acquires no additional weight in the warm bath. Seguin, from a great many experiments of this deſcription, concludes that there is no inhalation, becauſe the body, ſo far from gaining, always loſt ſome part of its weight during immerſion, although much leſs than in the air in equal times. Thus, in a bath heated from 10° to 12° of Reaumur, the loſs of weight was to that ſuſtained during the ſame time in air as 6.5 to 17; at the temperatures from 15° to 18°, as 7.5 to 21.7; and from 26° to 28°, as 13 to 23. La Medecine eclaircé par les Sciences Phyſiques, tom. iii.

In other experiments, again, as in thoſe of Drs. Gerard and Currie, there was no increaſe of weight; but neither was the body in general obſerved to have ſuffered any loſs during immerſion in the warm bath. "When I was at Buxton," ſays Dr. Currie, "in 1788, I made an experiment on the effects of bathing on the weight of my body, and after half an hour's immerſion, I found it rather diminiſhed than increaſed. This experiment had, I believe, been made before by Dr. Pearſon with the ſame reſult; it has ſince been repeated with great care, and it is aſcertained, as a fact, that no increaſe in the weight of the body is produced by immerſion in water at the temperature of 82°. In the year 1790, I had a patient in diabetes, whoſe cuticle, as is uſual in that diſeaſe, was in a morbid ſtate; and being deſirous of trying how far the inordinate action of the kidnies might be affected by a gentle ſtimulus applied to the ſkin, I immerſed him in a bath of the temperature of 96°, weighing him before and after immerſion. There was no ſenſible variation in the weight. This experiment has ſince been made by Dr. Gerard in another caſe of diabetes, an account of which is given in the publication of Dr. Rollo; and as it was repeated a great number of times with the utmoſt care and accuracy, it may be conſidered as eſtabliſhed, that immerſion in the warm bath in diabetes produces no increaſe in weight. I have made five different experiments of the ſame kind on myſelf, varying the heat of the bath from 87° to 95°, but never in any inſtance found my weight augmented." (Medical Reports, vol. i. p. 302.) The doctor then details a caſe of ſtrictured œſophagus, where the patient gradually waſted, and ultimately died of inanition, although he was immerſed daily in a tepid milk and water bath.

We may obſerve, concerning the facts juſt quoted, that they by no means warrant a deciſive negative inference. We have every reaſon to ſuppoſe that the action of the ſkin goes not uninterruptedly in the bath, and that the pulmonary exhalation proceeds as uſual. Yet the weight either continued unchanged, or, if any loſs was obſerved, this was conſtantly leſs, much leſs, than is experienced during the ſame interval in air: hence we may argue, that there muſt have been abſorption. Dr. Currie's caſe of ſtrictured œſophagus merits further conſideration: no experiment could be more unfavourable for an opponent of cutaneous abſorption. The patient, it is true, gained no weight while in the warm bath, but the loſs continually going on in the air, was, as in other trials, ſuſpended during the immerſions. "It is worthy of obſervation, that there was neither increaſe nor decreaſe of weight in the bath; yet Mr. M. was at this time waſting twenty ounces in 24 hours, and conſequently, if there was no abſorption in the bath, it might be ſuppoſed that he would have loſt five-ſixths of an ounce during the hour of immerſion. It is the more remarkable that there was no decreaſe, becauſe in the bath the ſkin always ſoftened, and the forehead became covered with a gentle moiſture." Beſides, "he always expreſſed great comfort from the bath, with abatement of thirſt,"

thirſt,” and “ ſubſequent to the daily uſe of it, the urine flowed more plentifully, and became leſs pungent.” An obſervation preciſely ſimilar is made by Mr. Cruikſhank: “ a patient of mine, with a ſtricture of the œſophagus, received nothing, either ſolid or liquid, into the ſtomach for two months; he was exceedingly thirſty, and complained of making no water. I ordered him the warm bath for an hour, evening and morning, for a month; his thirſt vaniſhed, and he made water in the ſame manner as when he uſed to drink by the mouth.” Anatomy of the Abſorbing Veſſels, p. 101.

Dr. Currie ſtates further, concerning his patient, that the diſcharge by urine alone exceeded much in weight the waſte of his whole body; and it cannot be doubted, he adds, that the diſcharge by ſtool and perſpiration exceeded the weight of the clyſters. Thus it appears that the egeſta exceeded the ingeſta in a proportion much greater than the waſte of the body will explain.” That cutaneous abſorption affords the only adequate ſolution of this phenomenon is an irreſiſtible concluſion. Still, however, this is denied. When forced to confeſs that there are caſes where the egeſta exceed the ingeſta, and which can only be accounted for by abſorption, the opponents of the cutaneous inhalation deny this function to the ſkin, and beſtow it moſt gratuitouſly on the lungs.

Many other examples might be cited, in which the body evidently acquired weight from ſome other quarter than by the food or drink. Haller has many ſuch inſtances. Rye and Linings gained ſeveral ounces by expoſure in a moiſt atmoſphere: and Fontana experienced a ſimilar occurrence.

Some facts, which oppoſe the notion of inhalation by the ſurface of the ſkin, have been obſerved in the applications of medicated ſubſtances to the body. Seguin made numerous experiments of this kind, with ſolutions of muriate of mercury on ſyphilitic patients: we are informed, that in caſes where the epidermis was perfectly ſound, neither the known effects of mercury on the body, nor any amelioration of the venereal ſymptoms, was ever obſerved. He alſo immerſed his own arm in a ſolution of two drachms of the mercurial muriate in ten pounds of water. At the temperature of 10° and 28° of Reaumur, no part of the ſalt was miſſing at the end of the experiment; but when the bath was at 18° of the ſame ſcale, there was a loſs of one or two grains of the muriate in the hour, though the quantity of fluid was not diminiſhed. It appears to us that the experiments on the whole ſhew that the muriate of mercury was not abſorbed; we can hardly admit that two grains were taken up as ſtated in this account. The entrance of ſo large a quantity of this very active preparation into the ſyſtem, muſt have been attended with very unpleaſant effects on the ſubject of the experiment, which do not ſeem to have occurred.

The effects produced on the odorous properties of the urine, by expoſure of the body to oil of turpentine, are well known. By inhaling the vapour of this fluid, the violet ſmell is imparted to the urine very ſpeedily: even a ſingle full inſpiration is ſufficient to produce the effect. Walking in a room where it has been ſpilled will operate in the ſame way. It has been proved by experiment that the lungs are the organs by which the abſorption takes place, and that the fluid is not taken up by the ſkin. Dr. Rouſſeau, of Philadelphia, expoſed his body freely to the turpentine vapour, breathing through a pipe, which communicated with the external air, and had no connection with the air of the room. No effect was produced on the urine. He immerſed his arm in ſpirit of turpentine for two hours, luting the veſſel containing it to the arm, ſo that no vapour could eſcape; no change was perceptible in the properties of the urine. He ſmeared his body all over ſeveral times with the ſpirits of turpentine, guarding againſt the inhalation of the vapour of the lungs, by breathing the external air through a tube. He continued this for ſome time, until the ſurface was irritated, and the pulſe quickened; the reſult was the ſame. Theſe experiments were frequently repeated, and with the ſame reſult, whether the ſpirit of turpentine was employed, or camphor, garlic, or muſk. Currie's Med. Rep. v. 1. chap. 19.

The exhalant veſſels of the ſkin ariſe in the exterior capillary ſyſtem, which ſurrounds the corion, and which affords the point of termination of the cutaneous arteries. They draw from this ſource the fluid which they pour out on the epidermis. We are entirely ignorant of their form, length, courſe and direction: but the phenomena of the cutaneous diſcharge, and of injections prove their exiſtence. They do not ſeem to be equally abundant in all parts: in the face and cheſt they are numerous, ſo that we ſweat eaſily in thoſe parts; the number is ſmaller in the back and limbs. Sweat is very ſeldom obſerved in the palms and ſoles: but there is great variety in theſe reſpects in different individuals.

It appears from experiments, that a conſiderable diſcharge takes place from the ſkin habitually, although not in a form cognizable by our ſenſes. This is called inſenſible perſpiration, or tranſpiration. Under particular circumſtances, the cutaneous diſcharge conſiſts of fluids poſſeſſing very ſenſible properties: this is called ſweat. The epithet inſenſible is applied to the former, to diſtinguiſh it from the ſweat, but under certain circumſtances it may be rendered obvious to the ſenſes. It has been often aſſerted that a vapour may be obſerved to ariſe from the body, and may be recognized by its ſhadow againſt a white wall in the ſummer. This is obſerved more readily in a denſe atmoſphere. Haller ſaw a kind of cloud or ſmoke ariſing from the face, hands, and indeed every part of the naked body in the ſubterraneous excavations of Clauſthal and Rammelſberg. A ſtill more obvious demonſtration of the tranſpiration is yielded by holding a finely poliſhed metallic ſurface near the ſkin; the watery vapour is condenſed by the metal, and clouds it. Under ordinary circumſtances, the whole diſcharge is evaporated as it is produced, and paſſes off in this inviſible form. As all bodies abſorb heat in changing from a fluid to a gaſeous form, this evaporation muſt have a very powerful effect in regulating the temperature of the animal frame. When the nature of our clothing confines the perſpiration, and prevents its evaporation, an unpleaſant feeling of heat is produced; this is particularly obſerved when the body is covered with oiled ſilk. On the other hand, expoſure of the ſkin in a naked ſtate, particularly in the wind, has a very rapid and powerful cooling effect. The importance of this function in regulating our heat did not eſcape the notice of that ſagacious obſerver Benj. Franklin: “ during the hot Sunday at Philadelphia, ſays he, in June 1750, when the thermometer was up at 100° in the ſhade, I ſat in my chamber without exerciſe, only reading and writing, with no other clothes on than a ſhirt, and pair of long linen drawers, the windows all open, and a briſk wind blowing through the houſe. The ſweat ran off the backs of my hands, and my ſhirt was often ſo wet as to induce me to call for dry ones to put on. My body, however, never grew ſo hot as the air, or as the inanimate bodies immerſed in the air.” (Letters and Papers, p. 365.) It does not appear that Franklin actually meaſured his heat; but he makes the inference of his comparative coolneſs from remembering that all the bodies about him, even the ſhirt out of his drawer, felt warm to the touch; and he concludes that he was kept cool “ by the continued ſweating, and by the evaporation of that ſweat.”

Probably ſweat is only an increaſed quantity of the ſame kind of fluid with that of the tranſpiration : very ſmall particles of fluid are obſerved on the ſkin, and they unite into larger and larger drops. Heat is the moſt common cauſe of ſweating, as it is a very powerful means of exciting the action of the heart, on which this phenomenon depends in many caſes : hence warm air and the warm bath are powerful cauſes. Strong bodily exertion, and warm food, by ſtimulating the vaſcular ſyſtem, produce the ſame effect. Fear, and other affections of the mind, fainting, and various morbid ſtates of the frame, alſo produce ſweating. We cannot name any particular degree of heat at which ſweating is certainly produced : and the pulſe is often very greatly accelerated in diſeaſe without this conſequence. Sometimes a particular part of the body only ſweats : ſometimes one ſide, as Haller has noticed in his own perſon.

Bichat enquires whether the nerves have any influence on the cutaneous diſcharge. He obſerves, that in palſied patients ſweat takes place on the diſeaſed as well as on the ſound ſide. "I lately," ſays he, "attended at the Hôtel Dieu a patient, in whom the left ſide of the body was rendered perfectly paralytic, in conſequence of an apoplectic attack : yet he ſweated only on this ſide. Examples of the oppoſite phenomenon are adduced ; but they cannot invalidate the common obſervation that the diſcharge is equal on both ſides. Is it not well known, that when the nervous action is entirely annihilated in a paralytic limb, bliſters affect it in the uſual manner ? Do convulſions, in which the nervous action is increaſed, augment the cutaneous exhalation ? Have the ſtates of acute ſenſibility, where there is in the cutaneous nerves ſo great a ſuſceptibility of impreſſions, any known influence on perſpiration ? Let us then confeſs, that in cutaneous exhalation, as well as in ſecretion, we are entirely ignorant of the nature of the nervous influence, if any ſuch exiſt."

The diſcharges by the ſkin and the kidney ſeem to be regarded by phyſiologiſts as the principal means by which the reſiduary matter of nutrition and digeſtion is expelled from the body : and they have attempted to ſhew the ratio which theſe bear to each other, to the pulmonary exhalation, and to the feces. We have not derived much information from theſe labours, which merely prove, in a general manner, that the diſcharge is effected through the internal organs in cold climates and ſeaſons, and through the ſkin under oppoſite circumſtances. In this reſpect, the kidney and the ſkin are always in oppoſite ſtates in relation to each other : in winter the urine is much loaded with ſubſtances, and in ſummer the perſpiration has a ſalt taſte and other peculiar characters, ariſing from matters which it does not contain in the former ſeaſon. Every individual muſt have obſerved in his own perſon that while he ſweats freely no urine is collected in the bladder ; and, that when the cutaneous diſcharge is interrupted, the ſecretion of the kidney goes on very actively.

We do not know much about the pulmonary exhalation, either as to its quantity, its nature, or its relations to the cutaneous diſcharge : but that the two organs very powerfully influence each other, is rendered very obvious by the phenomena of diſeaſe. The effect of expoſure to cold and moiſture in exciting pulmonary affections, and the diſpoſition to ſuch diſorders in the winter, when the cutaneous exhalants are leſs active, are well known.

We often have occaſion to obſerve a manifeſt connection between the perſpiration and the alvine diſcharges.

When the extent of the exhaling organ, the innumerable tubes by which it is penetrated, the quickneſs with which we can even ſee the perſpiration produced, are regarded, we ſhall expect to find that the quantity of the diſcharge is very conſiderable. Although it was known to the ancients, who had noticed its influence on the health, and introduced it into their pathology, we find little detailed information concerning this function before the ſeventeenth century, about the beginning of which it became the ſubject of the moſt patient reſearch, and of the moſt extenſive experiments perhaps ever undertaken. Sanctorius, a Venetian phyſician, dedicated thirty years to his experiments, which conſiſted chiefly in weighing whatever he ate and drank, as well as what he diſcharged by urine and ſtool. From him the inſenſible perſpiration has ſometimes received the epithet of Sanctorian. His example was followed by ſeveral perſons in different countries ; by Dodart in France ; by Keil, Robinſon, Rye, and Home in this country ; and by Linings, in South Carolina. Even our gay monarch, Charles II. amuſed himſelf with ſome experiments on this ſubject. Something muſt be taken from the numbers expreſſing the quantity of perſpiration, on account of the pulmonary exhalation, the mucus of the air paſſages and noſe, and ſpitting. For, in the experiments now alluded to, all the difference between the ingeſta and the egeſta is ſet down as loſs by inſenſible inſpiration.

In the experiments of Home, in Scotland, the food amounted to 4 lb. 3 oz. ; the feces to $3\frac{1}{2}$ oz. ; the urine to $2\frac{1}{2}$ lb., or $3\frac{1}{2}$ lb. ; the perſpiration, in the courſe of an hour, varied from two-thirds of an ounce to 4 oz., and even ſix under expoſure in the ſun. In the twelve hours of night, the perſpiration varied from 12 to 18 oz. ; and in $23\frac{1}{2}$ hours the diſcharge amounted to 3 lb. $3\frac{1}{2}$ oz. ; and on another occaſion, to 2 lb. $6\frac{1}{2}$ oz.

Rye, who lived at Cork, in Ireland, found the urine in the winter ſeaſon to amount in one day to $42\frac{7}{10}$ oz. ; the perſpiration to 53 oz. in ſpring, the urine wae 40 oz. ; the perſpiration 60 : in ſummer the numbers were 37 and 63. The average daily quantity of urine, therefore, was rather leſs than 40 oz., and that of the perſpiration $56\frac{1}{2}$ oz. The average daily amount of the feces was $4\frac{1}{2}$ oz. ; that of the food 96 oz. The large quantity of perſpiration in the winter is chiefly made up of what is produced during the night.

Keil found the medium quantity of perſpiration to be 31 oz. ; of urine 38 ; of feces 5 ; food 78.

Robinſon allows that the urine is diminiſhed, and the perſpiration increaſed in a very ſenſible manner in the ſummer, ſo that the average number of ounces of the former is in ſummer 27, in winter above 30. In the ſummer months the perſpiration and urine are as 5 and 3, in the winter as 2 and 3 ; in April, May, October, November, and December, they are nearly equal. In a young perſon he eſtimates the ratio of the perſpiration to the urine as 1340 to 1000 ; in an old one as 967 to 1000. He makes the average quantity of food 86 oz., and 58 when he was old ; the urine 35 and 28 ; the perſpiration 46 and $27\frac{1}{2}$; the feces $5\frac{1}{2}$ and $3\frac{1}{2}$. Thus the food and all the excretions are diminiſhed as age advances.

Hartman, in Germany, found the food to be 8 oz. ; the urine 28 ; feces 6 or 7 ; and perſpiration 45 or 46.

Dodart, in France, found that the perſpiration was to the feces as 7 to 1. He eſtimates the diſcharge in ſummer at 40 oz. 3 dr. 26 gr. ; in winter at 26 oz. 46 gr.

Sanctorius, in the warm and humid air of Venice, took 8 lb. of food ; the perſpiration amounted to 5 lb. ; the feces to 4 oz. ; and the urine in the night to 16 oz. ; in the twenty-four hours to 44 oz.

Linings has given us very accurate accounts of his experiments, which were performed in South Carolina. From his labours, as well as from thoſe of Robinſon, in Ireland, it appears that the perſpiration is moſt abundant in the warm months, and the urine in the cold: the former was in greater quantity during five months, and the latter during ſeven. The largeſt proportion of urine was 143 oz. which occurred in the month of December; and of the perſpiration 130 oz. in September. The average daily amount of the food, on a mean of experiments continued for a year, was 27,18 oz.; of the drink 102,17; of the urine 64,84; of the perſpiration 60,10; of the feces 4,35. The ingeſta were to the urine, throughout the whole year, as 2,02 to 1: but at many particular times they were as 3 to 2; their ratio to the perſpiration as 2,18 to 1; to the fecal diſcharge as 30,13 to 1; and the perſpiration of the whole year to the urine as 1 to 1,08. Theſe experiments differ from thoſe of Sanctorius and of Rye, in ſhewing that the urine exceeds the perſpiration even in a hot climate.

It appears doubtful, ſays Haller, on comparing together the reſults of the trials made by individuals of different ages in various climates and ſeaſons, whether the diſcharge by the ſkin exceeds that by the urine. On ſuch a compariſon we muſt ſet down the cutaneous exhalation much below the quantity aſſigned by Sanctorius, as it did not exceed 60 oz. in a very hot climate, and in colder countries was 56, 46, or even 30 oz.

It will be readily perceived, as we have already obſerved, that theſe calculations do not give the meaſure of the perſpiration alone, but of the cutaneous and pulmonary diſcharges together. To ſeparate theſe, and to determine the quantity of each, ſtill remained an important problem, the ſolution of which has been attempted only of late years.

Mr. Cruikſhank introduced his hand into a glaſs jar, and tied a bladder, fixed to the mouth of the jar, round his wriſt. In leſs than a minute the inſide of the bottle was rendered dim, as if it had been held over the ſteam of warm water: ſmall drops appeared in leſs than ten minutes, and a teaſpoonful of tranſparent and perfectly inſipid fluid, weighing 30 gr., was collected in an hour. Aſſuming that the hand is to the whole body as 1 to 60, and that the whole ſurface perſpires equally, the exhalation at this rate would be 7 lb. 6 oz. in 24 hours. When the experiment was repeated after taking exerciſe, 48 gr. were collected in an hour, which is at the rate of 12 lb. in 24 hours. By breathing into a bottle for an hour, this gentleman collected 124 gr. of inſipid tranſparent fluid: the produce in 24 hours at this rate would be 6 oz. 1 dr. 36 gr. If this be added to the former ſtatement of the cutaneous exhalation, the ſum will be 8 lb. 1 dr. 36 gr.; and the evaporation from the lungs will be little more than $\frac{1}{17}$th of the whole. Bichat ſays that he collected 2 oz. of fluid by breathing for an hour into a veſſel. Anat. Gener. t. 2, p. 701.

Mr. Abernethy collected from his hand and wriſt, incloſed in a glaſs jar for ſix hours, about 3 dr. of fluid. He eſtimated the ſurface from which this was collected at $\frac{1}{25}$th of the whole body: hence, if the perſpiration be equal at all times and in all parts, the produce in one day would be about 2½ lb. This reſult is ſo different from that of Mr. Cruikſhank, that there muſt be ſome ſignal error in the data on one ſide or the other.

The method adopted by Lavoiſier and Seguin ſeems calculated to afford reſults more worthy of our confidence. The whole body was incloſed in a ſilk bag, varniſhed with elaſtic gum, impenetrable by air or moiſture, having a ſmall opening carefully cemented round the mouth through which the perſon might breathe; ſo that whatever came from the lungs eſcaped, while the whole of the cutaneous diſcharge was confined within the bag. By weighing the body, therefore, before putting on this dreſs, and immediately after leaving it, the total loſs by the pulmonary and cutaneous diſcharges was aſcertained. The amount of the loſs by the lungs was known by weighing the ſubject of experiment juſt before he put on the dreſs, and again immediately before he removed it. When the latter quantity was ſubtracted from the total loſs, the remainder gave the value of the cutaneous diſcharge. From repeated trials performed in this manner, Seguin and Lavoiſier found the mean loſs, by the cutaneous and pulmonary exhalations, to be about 18 gr. in the minute, or 2 lb. 13 oz. in 24 hours. The pulmonary diſcharge amounted to 15 oz.; ſo that there remains 1 lb. 14 oz. as the mean quantity of daily perſpiration.

The greateſt quantity of matter perſpired in a minute was 26,25 gr. troy; and the minimum 9 gr. The quantity perſpired is increaſed by drink, but not by ſolid food. Perſpiration is at its minimum during meals, and immediately after: it reaches its maximum during digeſtion. Mémoires de l'Acad. des Sciences, 1790; or in Fourcroy, Syſt. des Connoiſſ. Chimiques, ſect. 8, ord. 3.

Our next object of inquiry is into the compoſition and properties of the cutaneous exhalation. As it eſcapes from the ſurface inſenſibly, there is a difficulty in collecting it in ſufficient quantity for examination: hence its nature and compoſition are very imperfectly known. Liſter, who collected it by placing his hand in a glaſs, found it to be water with a ſaltiſh or urinous taſte.

The fluid collected by Mr. Cruikſhank appeared to poſſeſs all the properties of pure water. When Mr. Abernethy had procured 3 dr. of fluid, he evaporated one-half: there remained on the glaſs a ſmall reſiduum, which had a very ſlight taſte of ſalt. The other half was ſuffered to ſtand many days, in which time no change appeared. It did not alter the colour of vegetable blue; no coagulation or precipitation of animal matter was produced by muriatic acid, neither was any change cauſed by the addition of pure alkali. It appeared, therefore, to Mr. Abernethy, that the water of perſpiration contains little of any thing, except a very ſmall portion of ſalt.

We cannot reaſonably doubt that the greater part of the matter of perſpiration is water; but it certainly contains other matters, of which the nature is not well aſcertained. Its ſenſible properties are often very perceptible: it cauſes the peculiar odour of the body, which is very remarkable in particular individuals, and poſſeſſes peculiar characters in whole races of mankind. Its ſmell is often ſour; and it is ſaid, under ſuch circumſtances, to change the vegetable blue colours to red. Berthollet thought he had detected the preſence of the phoſphoric acid; he obſerved that a blue paper, applied to a part labouring under a gouty paroxyſm, became red; but Fourcroy remarks, that if this acid were conſtantly ſecreted, it muſt accumulate on the ſkin, as it is too fixed to be volatilized with the aqueous vapour of perſpiration.

From the ſtrong odour of the perſpiration when profuſe, and from the tinge which it communicates to linen, there is reaſon to ſuppoſe that it contains a particular animal matter. In the perſpiration of the horſe, an animal ſubſtance of the nature of urea has been detected by Fourcroy and Vauquelin, who have alſo diſcovered that the phoſphate of lime is left in conſiderable quantity by the evaporation of the perſpired matter on the ſkin of the ſame animal. It ſeems to cryſtallize on the ſurface, and forms the branny matter detached by friction of the ſurface. The above-mentioned chemiſts obſerve that the urine of this animal contains no calcareous phoſphate.

Mr. Cruikſhank's experiments prove clearly that there is an oily matter ſecreted by the ſkin: indeed the familiar appearance of the repulſion of water, ſo as to cauſe it to run into globules, ſufficiently evinces the fact. Mr. Cruikſhank wore the ſame veſt of fleecy hoſiery night and day during the hotteſt part of the ſummer. At the end of this time he always found an oily ſubſtance accumulated in conſiderable maſſes on the nap of the inner ſurface of the veſt, in the form of black tears. When rubbed on paper, it makes it tranſparent, and hardens on it like greaſe. It burns with a white flame, leaving behind a charry reſiduum.

Beſides the condenſable vapour which is exhaled from the ſkin, it has been aſſerted that gaſeous fluids are alſo ſeparated. Many philoſophers have laboured on this ſubject, but the reſults of their experiments are ſo contradictory, that we cannot deduce from them any very ſatisfactory concluſion.

The count De Milly ſeems to have been the firſt who called the attention of philoſophers to this ſubject. He had often remarked the accumulation of ſmall air-bubbles on the ſurface of his body, when immerſed in the warm bath. At length, by means of a funnel and inverted glaſs jar he collected, in a few hours, half a French pint of the gas, which was examined by Lavoiſier. It was incapable of ſupporting combuſtion, produced a precipitation in lime water, and ſuffered no change from the admixture of nitrous gas. Acad. Roy. des Sciences de Berlin, 1777.

Mr. Cruikſhank found that a lighted taper, introduced into a bottle in which his hand or foot had been confined for ſome time, burned dimly; and lime water agitated in it was rendered turbid.

Ingenhouz could not procure the air from the ſkin in the warm bath in ſuch quantity as the Count de Milly did. What he collected ſeemed to be azotic gas. Experiences ſur les Vegetaux, t. 1.

Prieſtley denies that any gas is perſpired by the ſkin. He repeated the experiments of Ingenhouz, and never could obſerve the appearance of gas ariſing from the body when he employed boiled rain water, from which the air had been completely expelled, and detached the adhering bubbles from his arm. He obſerves that the air obtained by Ingenhouz "was juſt that mixture of fixed air and partially phlogiſticated air, that pump-water, which he recommends for the purpoſe, generally abounds with." Experiments and Obſervations, vol. v. p. 103.

Fontana arrived at the ſame concluſion from his reſearches.

Such alſo was the reſult of Mr Jurine's experience, who, after remaining in the bath at different temperatures from 18° to 30° of Reaumur for hours together, never could procure a ſingle bubble of air from his ſkin. He obtained the ſame reſult from obſervations on ſeveral individuals in water of various temperatures. Hiſtoire de la Societé Royale de Medecine, tom. 10.

Mr. Cruikſhank's experiments ſeemed to prove that air, which has been confined for ſome time in contact with the ſkin, becomes changed; though Dr. Prieſtley maintained that the perſpirable matter has no ſuch effect on the air, but leaves it as wholeſome as ever.

A very extenſive ſet of experiments performed by Mr. Jurine, of Geneva, and publiſhed in the volume already quoted of the Memoirs of the Royal Society of Medicine, ſeems to confirm the obſervation of Mr. Cruikſhank. Although Mr. Jurine could not collect any air from his ſkin, when immerſed in the warm bath, he always found the air confined about the ſkin much vitiated. He fixed well-dried bottles under his arm-pits, and round his waiſt, and having left them there for an hour, accurately corked and removed them, that the contained air might be examined by the uſual teſts. In theſe experiments he always employed the mercurial trough. This air was found, on different occaſions, to contain .7, .7½, .6, .4½ of carbonic acid gas. He next incloſed his arm in a glaſs cylinder containing 685 cubic inches of air. One extremity of this veſſel cloſely embraced his arm, round which it was cemented. To the other extremity was fixed a bent tube, which, during the experiment, was plunged under water in the pneumatic trough. After two hours, the air of the cylinder was found to contain .8 of carbonic acid gas. In another experiment the ſame quantity was obtained after one hour; but the proportion of carbonic acid gas was not greater at the end of two, three, or four hours. Being thus ſatisfied that carbonic acid gas is formed by the ſkin when in contact with the air of the atmoſphere; he concluded, that he ſhould find the ſame gas under the bed clothes which confine the air round the body during ſleep; and in experiments on different individuals he found that this air contained .4, .6, .7, .8 of carbonic acid gas.

In the ſame volume are ſome experiments by Gattoni, which do not lead to the ſame concluſions with thoſe of Jurine: but they do not ſeem to have been very accurately performed, and the teſt of lime water was not employed.

We come in the next place to the reſearches of Mr. Abernethy. From the hand, introduced into a glaſs jar filled with mercury and inverted, he collected, in the ſpace of ſixteen hours, one half-ounce meaſure of air, which had eſcaped in ſmall bubbles from every point of the ſurface of the immerſed hand. Two-thirds of this gas were abſorbed by lime water; and the remainder ſuffered no diminution from the admixture of nitrous gas. When the experiment was repeated under water, a ſmall quantity of azotic gas only was obtained, the carbonic acid having been, in the opinion of Mr. Abernethy, abſorbed by the water. The hand was expoſed five hours, in a jar containing ſeven ounces of atmoſpheric air, which was diminiſhed about half an ounce. One ounce of the remainder was abſorbed by lime water, with precipitation of the lime. By the teſt of nitrous gas the air was found to contain nearly ⅙th leſs of oxygenous gas than it did before the experiment. When a ſimilar experiment was performed with ſeven ounces of azotic gas, rather more than one ounce meaſure of carbonic acid gas was produced in two hours. The trials were repeated with hydrogenous, nitrous, and oxygenous gaſes, and in every inſtance nearly the ſame quantity of carbonic acid gas was obtained.

In the 45th vol. of the Annales de Chimie, there is a ſhort paper by Dr. Trouſſet, who had noticed, like Milly, the appearance of bubbles on the ſkin in the warm bath. He ſeems to have ſeen this only in two individuals, and found the air to be perfectly pure nitrogen. In his own perſon, and in many others, he could obſerve nothing of the kind.

Spallanzani is the laſt experimental philoſopher who has paid particular attention to this ſubject. The detail of his experiments has not been publiſhed, but the reſults are preſerved in a letter to Senebier, introductory to the Memoirs on Reſpiration. He appears to have been completely ſatisfied that air in contact with the ſkin is changed exactly in the ſame manner as by reſpiration. When atmoſpherical air was employed, oxygen diſappeared, and carbonic acid gas was produced: he was of opinion, that the oxygen of the atmoſphere had no ſhare in the production of the carbonic acid gas, becauſe it was equally great when the animal was confined in gaſes containing no oxygen; and he therefore concludes, that the carbonic acid gas was exhaled, and the oxygen abſorbed.

On a review of theſe very contradictory evidences we do not ſeem to be warranted in believing that any gas is ſeparated from the ſkin: but perhaps we may conclude that the air in contact with the organ undergoes a peculiar modification.

Sebaceous Glands of the Skin.—This organ is habitually covered with an oily ſubſtance, which occaſions water to run into globules on the ſurface of the body, which imparts a greaſy ſtain to linen, when it is worn for a long time, and which occaſions duſt, &c. to adhere to the ſkin. This unctuous ſubſtance is more abundant in ſome parts of the body than in others. About the face it is obſerved in conſiderable quantities, and on the hairy ſcalp. Hence, when perſonal cleanlineſs is not ſufficiently attended to, the hair becomes quite greaſy and ſhining. It is abundant in ſituations expoſed to friction, as the axillæ, perinæum, &c.; and when confined in ſuch parts cauſes a very diſagreeable odour. It is found in very ſmall quantity, ſo that it can hardly be obſerved, in the palms and ſoles. Certain races of mankind, as the negroes, have it in great abundance. Probably the ſenſible qualities of the cutaneous diſcharge depend in great meaſure on this matter, the particular nature of which is but little underſtood. It does not ſeem to undergo thoſe changes of augmentation and diminution which are obſervable in the perſpiration. Its obvious utility ſeems to be that of protecting the ſkin from the agency of external cauſes, and keeping it in a ſtate of ſoftneſs.

Is this matter ſimply an exhalation from the cutaneous veſſels, or is it produced by glandular apparatus? In ſome parts of the ſkin, as about the noſe, and in other ſituations of the face, the external ear, &c. there are very manifeſt ſmall roundiſh bodies, with a ſimple aperture, from which a ſebaceous matter may be ſometimes expreſſed like a fine thread. Morgagni alſo admits their exiſtence in the neck, back, perinæum, buttocks, &c. Haller does not conceive that they are proved to exiſt in all parts, and we certainly do not find them: yet this oily matter is formed over the whole body. The examples of the fat of the cellular interſtices and of the medullary fluid of bones ſhew us that the exhalants can produce matters of this kind.

Properties of the Dermoid Syſtem.

1. *Properties reſulting from Organization.*—Theſe are found to exiſt in the ſkin in a very ſtriking degree: the changes of ſize, in which different parts, particularly the limbs, ſwell to twice or three times their natural bulk, and then recover their former ſtate, prove theſe properties; and the various tumours, external aneuriſms, ſudden diſtentions from great bruiſes, collections of fluid in the abdomen, pregnancy, enlargements of the teſticle, &c. afford additional proofs. In all theſe caſes the ſkin is firſt expanded, and then is reſtored when the diſtending cauſe ceaſes to act. A ſquare inch of integument has been found able to ſuſtain a weight of 200lb..

The contractility of the ſkin occaſions the retraction of its edges when it is cut: and this occurs in the dead ſubject; but it ſeems to be heightened by the vital powers as it occurs to a much greater degree during life.

The extenſibility of the ſkin is leſs in many caſes than it would appear to be on firſt ſight, as the neighbouring integuments are drawn over a tumour. Thus in large ſwellings in the ſcrotum, the ſkin of the penis covers part of the tumour, &c.: in extenſive cicatrices the ſkin of the ſurrounding parts is drawn towards the centre of the ulcer.

In moſt extenſions the thickneſs of the dermoid tiſſue is diminiſhed. When it is diſtended by the infiltration of water in its interſtices, as in anaſarca, its thickneſs increaſes, while the denſity is diminiſhed. It ſeems to loſe the power of extenſion, ſo as to burſt under the action of a diſtending cauſe, from chronic inflammation. Moſt of the chronic affections, which alter the tiſſue of this organ, deſtroy its contractile power.

Vital Properties.

2. *Properties of the Animal Life.*—Animal ſenſibility exiſts in this organ in a very high degree: it preſides over the general ſenſe of feeling, which is more acute in this than in other tiſſues, and alſo that of touch, which is very diſtinct from the former. The general ſenſe, called by the French tact, is the power of perceiving the impreſſions of ſurrounding objects: in this ſignification it ſeems to mean the ſame as the Engliſh word feeling, which is the office of a nerve in general; as thoſe organs only are ſo affected by external bodies as to produce ſome change by which the mind is rendered conſcious that the bodily organ has been modified. Thus heat and cold, roughneſs and ſmoothneſs, hardneſs and ſoftneſs, moiſture and dryneſs; preſſure cauſing pain; acrid qualities; titillation producing itching, &c. are all perceived by the nerves. This kind of tact belongs to the whole body; and does not ſuppoſe any peculiar arrangement of the organ; it is merely the animal ſenſibility conſidered in a ſtate of exerciſe. Thus, when the particular modifications of this ſenſibility belonging to the other ſenſes have been deſtroyed; when the eye is inſenſible to light, the ear to ſounds, &c. the organs ſtill retain the power of perceiving the preſence of bodies and their general attributes.

The ſenſe of touch is the power belonging to the ſkin alone, of examining more minutely and accurately thoſe properties of bodies, which we have juſt named. For this purpoſe we employ chiefly the ends of the fingers; thoſe of the toes ſeem to be organized exactly in the ſame way, but are incapable of being turned to this uſe by the hardneſs of their coverings. Theſe parts are conſpicuous for the ſize of their nerves, and for the number and prominence of the papillæ. This organization gives to them a more exquiſite ſenſibility of the ſame kind with that belonging to the ſkin in general. The form of the organ in the human ſubject, where it is compoſed of ſeveral moveable parts, adapts it particularly to ſerve as an inſtrument of touch, by facilitating its application to external objects; and this advantage may be more particularly ſeen in bodies of a rounded figure. We rub the fingers gently againſt the object, ſo as to apply the papillæ ſucceſſively to the different points of its ſurface. Whether any phyſical change takes place in the organ, whether the papillæ for example are erected or no, is entirely unknown.

The diſtinction of colours by blind perſons, if ſuch a power has really exiſted in any inſtances, muſt have ariſen from modifications in the ſurface produced by the colouring matter. We know that the touch in all caſes of blindneſs acquires great acuteneſs, as it muſt be ſo much more exerciſed and depended on, than in individuals who can ſee.

The temperature of bodies is eſtimated by a compariſon; thoſe are called cold, which are of a lower temperature than what we had felt immediately before; and *vice verſâ*. Or we refer to the ſtate of our own ſurface, and call the objects, from which heat paſſes to us, warm, and thoſe of the oppoſite kind cold. The ſame fluid will appear cold to one hand

and warm to the other, if we have previouſly immerſed one in a warmer, and the other in a colder medium.

It has been conceived that the ſenſe of touch is of great uſe to us in correcting the errors of the other ſenſes, and particularly of the ſight. This peculiarity belongs to it certainly, that the organ is modified by the very body whoſe properties we are examining; while, in the caſe of viſion for example, the eye is affected not by the object itſelf, but by the rays of light. Perhaps we are leſs deceived by the other ſenſes, and by that of ſight itſelf, than has been commonly imagined. Without any aſſiſtance from the ſenſe of touch, for which his organization entirely diſqualifies him, the horſe meaſures the hedge or ditch with his eye moſt accurately, and clears the diſtance with great exactneſs. Newly born animals ſeem to commit no errors in ſeeking their food or their parents, &c. On the other hand, the touch is not free from error. The experiment of rolling a round body under two fingers decuſſated, which give us the ſenſation of two bodies, ſhews this. Moreover, the touch no more informs us of the real nature of things, than any other ſenſe; we acquire a knowledge of their properties through certain interpoſed media, and alterations in them very much modify the perception. When the epidermis is removed, external bodies cauſe pain, and do not excite the impreſſions, which inform us of tangible properties; again, when the cuticle is preternaturally thick, as in the hands of labouring men, no ſenſation takes place.

This ſenſe is alſo ſubject to various morbid conditions. In hypochondriacs there is ſometimes a feeling as of cold air; and the ſlighteſt contact of air is intolerable. Ann of Auſtria found the fineſt linen manufactures unpleaſantly rough; and ſome have not been able to endure the touch of ſilk, or of the down of a peach.

Habit, too, has a powerful influence in modifying the impreſſions which we receive from the touch. The heat of a glaſs-houſe, which is ſuſtained without any unpleaſant feeling by the workmen for ſeveral hours, is intolerable to a perſon unaccuſtomed to it.

The touch differs from the other ſenſes in not requiring a peculiar mode of ſenſibility for its exerciſe; the hand is rather more ſenſible than the reſt of the ſkin, but we can touch with other parts of our ſurface. In the other ſenſes there are peculiar kinds of ſenſibility diſpoſing the organs to be acted on by particular objects, and rendering them unſuſceptible of other impreſſions. The exerciſe of the touch is determined by volition, and is generally conſequent on the employment of the other ſenſes.

Moſt of the other ſenſes require an expreſs organic arrangement, as well as a peculiar ſenſibility in the organ; the touch, on the contrary, requires only a particular form in its organs. If they have the animal ſenſibility, and can embrace objects by ſeveral points, they can diſtinguiſh the tangible properties. The touch will be imperfect, if the organ is in contact with the body only in one or two points; yet it will take place. Thus we can touch with the hollow of the axilla, at the bend of the elbow, or the knee. But the ſenſe is exerted more advantageouſly when the points of contact are multiplied. The ſtructure of the human hand is particularly well contrived in this point of view; it ſhews us that man is calculated, much more than the animals, for communication with ſurrounding objects; that the domain of his animal life is therefore much more extenſive; that his ſenſations are more preciſe, as they poſſeſs an additional means of perfection; that his intellectual faculties are capable of filling an infinitely greater ſphere, becauſe they are grounded on the exertion of a much more perfect organ.

The ſenſibility of the ſkin ſeems to reſide eſſentially in the papillæ, which is the part of the integuments truly belonging to the animal life, as the vaſcular plexus, compoſing the reticular body, is connected with the organic functions. Its very acute ſenſibility requires a protection from too ſtrong impreſſions; and this is afforded by the epidermis. When that is removed, even the impreſſion of the air is painful, and cauſes a ſenſation, which we call ſmarting, which belongs perhaps excluſively to the dermoid ſyſtem. It is felt in burns, bliſters, eryſipelas, and in all the inflammations affecting the reticular body of the ſkin. Itching is another mode of ſenſation peculiar to this ſyſtem.

Beſides the impreſſions, which teach us the properties of bodies, the exerciſe of this organ produces feelings of pleaſure and pain. So far as the ſenſe of touch is concerned, pleaſure may be conſidered as that condition of the body, which we ſhould wiſh to have continued. The more exquiſite feelings of this kind are produced by friction of the papillæ. Without referring to venereal ſenſations, we may mention a practice of the Chineſe, of introducing a ſmall pencil into the ear and moving it round ſo as to excite a very acute pleaſurable feeling. Tickling muſt be ſomething of this kind; it is peculiar to the ſkin, and in many individuals excites ſenſations which are almoſt intolerable. Great differences in this reſpect are obſerved in different perſons. Pain is the very reverſe of pleaſure; and, in the ſkin, is the moſt acute, when the naked organ, where it poſſeſſes many papillæ, is irritated.

The animal ſenſibility of the ſkin, like that of the mucous ſurfaces, is under the powerful influence of habit, which transforms ſucceſſively into indifference, and into pleaſure what was at firſt painful. The air in the ſucceſſion of the ſeaſons, heat in the various ſtates of the atmoſphere, water in the bath, or in the humid vapours with which it loads the medium in which we live, our clothes, of which the woollen are at firſt very unpleaſant, in ſhort, every thing which acts on the ſkin by ſimple contact, produces ſenſations which are inceſſantly modified by habit. Obſerve the varieties of dreſs in different countries; ſometimes the upper limbs are uncovered, ſometimes the lower; in ſome inſtances more or leſs of the trunk is expoſed to the air; often the ſavage is entirely naked. The parts which are left naked in each people, ſupport the contact of the air without any painful ſenſation. Expoſe, on the contrary, the parts which are habitually covered, particularly if the atmoſphere be cool, a painful ſenſation will be produced at firſt, but, as the parts become gradually habituated to the contact, they are at laſt inſenſible to it.

But habit has no power over that heightened ſtate of the cutaneous ſenſibility, which reſults from an organic affection, as inflammation for example. The ſlighteſt contact of a foreign body is extremely painful in this caſe; and conſequently the ſkin can no longer exert its function of touch. Even the tact, or the power of diſtinguiſhing general ſenſations, is deſtroyed. The impreſſion of all bodies is uniform; it is that of pain.

The animal ſenſibility of the ſkin may be diminiſhed or deſtroyed, as in paralyſes; but the whole organ is never affected; and in this reſpect there is very ſeldom even hemiplegia. Theſe caſes afford a further proof that the cutaneous exhalation and capillary circulation are not influenced by the nerves, ſince both go on very well as they do in the paralyſis of the moving organs.

Properties of the Organic Life.—The organic ſenſibility and the inſenſible contractility exiſt in the ſkin in a very high degree, and reſide particularly in the exterior capillary ſyſtem, which forms the reticular body. On theſe properties depend immediately, 1, the capillary circulation; 2, the cutaneous exhalation; 3, the abſorption; 4, the nutrition of the dermoid ſyſtem; and 5, the ſecretion of the cutaneous oil, where ſebaceous glands exiſt. Beſides theſe numerous functions, we muſt reflect that the ſkin is conſtantly expoſed to the action of external cauſes, which keep it in a ſtate of habitual excitation, as the contents of mucous ſurfaces act on thoſe ſurfaces.

The ſkin does not ſeem to poſſeſs the ſenſible organic contractility; irritating applications act only on the capillaries, and therefore produce an effect, which is not obvious to the eye. Yet the corrugation of the integuments under the ſtrong action of cold, reſembles in ſome reſpects the ſenſible organic contractility; this, which takes place in the corion, ſeems to hold the middle between the two kinds of organic contractility.

Paſſive Sympathies.—The animal ſenſibility is often brought into action ſympathetically in the ſkin, by the affections of other ſyſtems. There are various examples of itching, &c. without any derangement of the part, to which the ſenſation is referred.

Very often the feeling of heat or cold occurs in the ſkin, when there is no cauſe affecting the organ to produce ſuch ſenſations; there ſeems to be an erroneous reference of the unpleaſant feeling to its ſource as in the caſe of pains felt in amputated limbs. The ſhiverings which occur at the commencement of moſt acute local diſeaſes are of this kind: there is often a ſudden and ſympathetic ſenſation of cold on the ſkin at the moment of the expulſion of the ſemen; the ſhivering of fear, and the ſweat which often accompanies it, ſeem to be of the ſame nature. A ſpecies of ſympathetic cold is alſo often referred to the ſkin at the commencement of digeſtion.

The feeling of heat often occurs ſympathetically in the ſkin. The fluſhings, which occur ſo often and irregularly in different fevers, are well known, and are not attended with any diſengagement of caloric. Theſe feelings of heat and cold are produced without any alteration of temperature, as ſympathetic pains occur without the action of thoſe obvious cauſes, which give riſe to them under other circumſtances. In fact, the ſympathies of the animal ſenſibility call into action, in each ſyſtem, the feeling which is habitual to it. The ſame cauſe which produces the ſenſation of heat or cold in the ſkin, would have given riſe to that of laſſitude in the muſcles, &c.

The organic properties of the ſkin are frequently called into action by ſympathies: thus cold drinks ſuppreſs perſpiration. Augmented cutaneous exhalation follows almoſt immediately the introduction of warm fluids into the ſtomach. The ſweat of fear and that of conſumption are of the ſame nature. Diſeaſes exhibit to us innumerable varieties of dryneſs and moiſture of the organ, phenomena which are generally ſympathetic.

Active Sympathies.—The irritation of the ſkin in tickling, in very ſenſible individuals, excites various organs ſympathetically; as the heart, producing fainting; the ſtomach, vomiting; and the brain, convulſions. Affections of the cutaneous exhalants, or of the capillary ſyſtem, from which they ariſe, act ſympathetically on various organs. Thus the warm bath diſturbs the proceſs of digeſtion; while its influence in many caſes allays diſorders of the ſtomach. The action of cold on the ſurface, particularly during ſweating, produces ſeveral ſympathetic effects. We expreſs what occurs very inaccurately, when we refer it to the tranſlation or repulſion of the perſpiratory matter. The organic ſenſibility of the pleura is ſympathetically affected by the application of cold to the ſkin; juſt as an uterine or naſal hemorrhage may be ſtopped. The ſuppreſſion of tranſpiration is an acceſſory circumſtance completely foreign to the internal inflammation. If there were no perſpiration at the time that the cold is applied, the inflammation would ſtill come on.

The ſhaking of the muſcles, and the concentration of the pulſe, produced by the weakened action of the heart, are phenomena cauſed entirely by the action of cold on the ſkin.

The numerous phenomena occaſioned by the ſudden diſappearance of cutaneous eruptions ſhould be referred to modifications of the vital properties of the organs, and not to any morbific matter repelled from the ſkin.

The ſerous ſurfaces and the cellular ſubſtance on one ſide, and the ſkin on the other, are often in oppoſition in diſeaſes. Patients never ſweat during the formation of dropſies; and this dryneſs of the ſkin is often more remarkable than the ſmall quantity of urine.

Characters of the vital Properties.—1. They vary in the different regions of the body. The palms and ſoles are the moſt diſtinguiſhed for their animal ſenſibility: the hypochondria are ſo ſenſible in ſome individuals, that tickling will produce convulſions: the anterior and lateral parts of the trunk are more ſenſible than the back. The organic properties do not differ leſs; of which the great ſuſceptibility of the face to the influx of blood is a proof. Particular parts are ſubject to particular cutaneous diſeaſes, &c.

2. Intermiſſion of action in one reſpect, uninterrupted continuance in another. The former character belongs to this ſyſtem, as to all the ſenſes, in its animal ſenſibility. Immediately before ſleep comes on, external objects produce but an obſcure ſenſation, which is entirely loſt in that ſtate, in which animals ſeem to part with half their exiſtence. Yet the touch ſeems to be exerted occaſionally while the other ſenſes are in repoſe: pinch the limb of a perſon ſleeping, and he will move it without waking, or retaining any recollection of the occurrence. In its organic ſenſibility the life of the cutaneous ſyſtem is uninterrupted; conſequently the functions, over which this property preſides, have an oppoſite character to the preceding. The inſenſible tranſpiration goes on continually, although it is more active at ſome times than at others.

3. Influence of ſex. The animal ſenſibility is more acute in women, in whom every thing belonging to the ſenſes is more developed, while the power of the muſcles predominates in man. No very ſenſible difference can be remarked in the organic properties.

4. Influence of temperament. The colour and other ſenſible properties of the ſkin vary in individuals, and theſe variations even conſtitute characters of the different temperaments. When we ſee theſe differences of organization, can we be ſurpriſed at finding that the ſenſe of touch is acute in ſome, dull in others; that ſome perſons are very ſuſceptible of tickling, and others almoſt inſenſible to it? That the organic ſenſibility admits a great quantity of blood into the capillaries of the face in ſome, and rejects it in others; that ſome have a moiſt and others a dry ſkin; that there are diſpoſitions in individuals to particular cutaneous affections, chronic or acute? &c. &c.

Development of the dermoid Syſtem.—The ſkin, in the early times of conception, appears as a viſcid coating, which is gradually condenſed into a tranſparent layer, torn by the ſlighteſt violence, and allowing the ſubjacent organs, particularly the blood-veſſels, to be eaſily ſeen through it. Its conſiſtence increaſes until it acquires the appearance exhibited at the time of birth. In its mucous ſtate cellular ſubſtance and veſſels compoſe it entirely: when the fibres of the corion are added, it becomes firmer. The external ſurface exhibits but few of the wrinkles deſcribed above: they are prevented from appearing by the large quantity of ſubjacent fat. The inner ſurface adheres but ſlightly to the cellular layer under it. It contains more blood than at any other period of life. The animal ſenſibility is not yet called into exerciſe; there are no cauſes to excite it. Is the organic ſenſibility in action at this time? It muſt be ſo in a certain degree to produce the unctuous ſecretion, by which the ſurface is covered.

This ſyſtem undergoes a ſudden revolution at the inſtant of birth. Hitherto it has received only black blood, and is conſequently more or leſs livid at birth. This colour gives place to red, produced by the arterial blood now firſt formed: and the ſtate of the ſkin in this reſpect may be conſidered as an index of what is paſſing in the lungs. All parts of the organ are penetrated uniformly by the red colour. A ſudden excitation is thus communicated to the organ, exalting its vital properties, and rendering it more ſuſceptible of the impreſſions of ſurrounding objects. The ſurrounding temperature, the air, clothes, the water uſed in waſhing it, communicate to the ſkin an excitation, which is the more ſenſible in proportion to its novelty. The ſympathies connecting the ſkin to the other organs now become neceſſary: thus the internal organs quickly feel the excitations applied externally

The organic ſenſibility is augmented at the ſame time; tranſpiration is eſtabliſhed; various ſubſtances are ſeparated by it; others perhaps abſorbed; and various diſeaſed affections ſhew themſelves.

The organ ſtill continues ſoft for ſome time after birth; and melts entirely into jelly very eaſily by ebullition. Its denſity increaſes gradually, but has not arrived at its greateſt ſtate till towards the thirtieth year. As this augmentation proceeds, the fibrous ſubſtance is increaſed in proportion to the gelatinous. At the ſame time the adheſion of the internal ſurface to the cellular ſubſtance becomes ſtronger, and the wrinkles of the face are gradually formed. No remarkable change is produced in this organ at puberty: ſweats are more abundant after this time; in children the reſidue of nutrition paſſes off by the kidneys rather than by the ſkin.

The organ ſtill retains a great activity after the age of growth, and very eaſily influences other parts of the frame: hence the peripneumonies, pleuriſies, &c. produced by the action of cold.

The increaſe of the fibrous ſubſtance renders it more firm: leſs blood ſeems to be ſent into its veſſels, and it is leſs ſubject to thoſe eruptions ſo common in infancy and youth.

In declining age the dermoid ſyſtem becomes more and more denſe: it reſiſts ebullition for a long time, but yields a firmer and more conſiſtent, though leſs abundant jelly. It is ſtronger but leſs pliant. The blood penetrates it in ſmaller and ſmaller quantity: the redneſs of the cheeks diſappears. The adheſion to the cellular ſubſtance is much more cloſe. All the wrinkles are more ſtrongly marked, and ſeveral are now perceptible for the firſt time.

The vital powers of the ſkin are more weakened than thoſe of other ſyſtems in the old man, becauſe it has been more excited by external objects during life: the habit of feeling has blunted its ſenſibility. The touch is now exerciſed but rarely; as this ſenſe is employed in a great meaſure in ſubſervience to thoſe of ſight, hearing, &c. to rectify or confirm our other ſenſations, the old man, being acquainted with what ſurrounds him, has no motive for the uſe of his organ of touch. Contraſt, in this point of view, the two extremes of life. The infant, to whom every impreſſion on the ſight, hearing, &c. is new, wiſhes to touch, to ſeize every thing: his hands are in conſtant motion. Touching is a great pleaſure to him, becauſe all new ſenſations are agreeable. If an old man were placed in the midſt of objects, which had never before impreſſed his ſenſes, he would exerciſe his touch more frequently; but, among the things to which he is habituated, there is nothing to excite him. Hence old age is no longer the time of enjoyment. Almoſt all our pleaſures are relative; as habit renders theſe leſs lively, they ceaſe in conſequence of having exiſted; thus the advance of years, by leaving us few new ſenſations, diminiſhes the ſources of our happineſs. For the contrary reaſon the happieſt age is that of infancy; becauſe the whole domain of ſenſation lies before us unexplored; at every ſtep of his advancement man leaves behind him a ſource of enjoyment. His career ends in indifference, a ſtate very ſuitable to that period, as it diminiſhes the interval between life and death.

The following phenomena ſhew that the organic, as well as the animal ſenſibility, is remarkably diminiſhed in the old man. Contagions are leſs eaſily abſorbed. The ſweat is leſs abundant, and hardly ever exhibits thoſe augmentations which are ſo frequent in the adult. The greaſy covering is leſs copious, and hence the ſurface is drier. The various morbid affections, ſuch as eryſipelas, and the various eruptions, are leſs common and much ſlower. The power of reſiſting cold is ſenſibly diminiſhed.

Epidermoid or cuticular Syſtem.—The ſlighteſt examination is ſufficient to ſhew very ſtriking differences between this and the preceding ſyſtem, although phyſiologiſts have generally deſcribed this merely as a dependance of the former. The organization, properties, functions, mode of growth, in ſhort, every circumſtance is different in the two caſes.

Under this head we conſider the exterior epidermis; that which covers a part of the mucous ſyſtem; and the nails. Many characters approximate the latter to the epidermis, although the external appearance is very different.

The *exterior epidermis* is a tranſparent layer, differing in thickneſs in different parts, every where covering the ſkin, and immediately expoſed to the excitation of external bodies.

It has the ſame inequalities as the cutis, ſince they are every where exactly contiguous. Various pores penetrate it, and terminate on its ſurface: the more conſpicuous ones tranſmit the hairs; others give paſſage to exhalants. The latter are not eaſily ſeen; but if, when the ſkin is dry, we ſuddenly begin to ſweat, we can diſtinguiſh them by the ſmall points of moiſture then exhibited over the whole cutaneous ſurface. We cannot actually ſee the pores in the dead cuticle, even with the aſſiſtance of the microſcope; and the fluid under a bliſter does not eſcape through them: but the phenomena exhibited during life leave no doubt of their exiſtence. The internal ſurface adheres moſt cloſely to the outer ſurface of the cutis. We conceive the union to be by means of the exhaling and abſorbing veſſels and the hairs. Dr. Hunter thought that the veſſels could be demonſtrated. On ſeparating the cuticle after long maceration, particularly in the ſole of the foot, a vaſt number of extremely fine and ſoft threads are ſeen paſſing between it and the cutis: they break after being extended to about one-eighth of an inch. Theſe may be veſſels; but it is only a conjecture. On examining the ſurface of the ſeparated cuticle, numerous prolongations of various lengths are obſerved, appearing like ſmall ends of fine threads, or as mere inequalities, and diſpoſed obliquely. Theſe may be abſorbents and exhalants. Whatever the medium of connection may be, the adheſion of the parts to each other is very ſtrong.

Various cauſes deſtroy this adheſion of the epidermis, and occaſion its ſeparation. Acute inflammations, as eryſipelas, phlegmon, &c. are followed by its detachment; and various eruptions, not of an inflammatory nature, cauſe its detachment in a dry ſcaly form; which has given riſe to the notion that it is made up of ſcales in its natural ſtate. When the ſkin is unequal on the ſurface, friction detaches it in ſmall ſcales, which give a very rough appearance to the part. Fevers are not unfrequently followed by deſquamation of ſkin. The action of veſicatories is familiarly known. In the dead ſubject, putrefaction, maceration, and ebullition are the moſt effectual means of accompliſhing the ſeparation.

The thickneſs of the epidermis is in general very uniform: it does not ſeem to follow thoſe varieties which we obſerve in the cutis of the trunk, limbs, &c. It is only in the palms and ſoles, and on the correſponding ſurfaces of the fingers and toes, that its thickneſs is increaſed: and here the augmentation is ſo conſiderable, that there is no proportion between theſe and other parts of the body.

There ſeem to be in this part ſeveral additional laminæ; and the inner ſurface, after ſeparation, does not exhibit thoſe proceſſes already ſpoken of. This exceſſive thickneſs prevents the action of bliſters. In repeated trials Bichat found that they produced no effect. The tranſparence of the epidermis is deſtroyed by this thickneſs: it is here whitiſh, and even opaque. Hence, in the negro, it conceals the black colour of the reticular body; which, however, is, at the ſame time, leſs black here than in other parts. The epidermis in theſe ſituations is manifeſtly compoſed of ſucceſſive laminæ, adhering with ſuch force, as to be very difficultly ſeparated: in all other parts we can diſcern only a ſimple layer. No fluid can be noticed in this tiſſue: when cut in various directions, either in the living or dead ſubject, nothing exudes. Its ſcales are always perfectly dry: the abſorbents and exhalants merely traverſe it. No blood in the living ſtate, nor injection after death, enter it in any caſe. It never participates in the diſeaſes of the ſubjacent organ, except by being elevated when that is ſwollen, and then detached. Nerves and cellular tiſſue are completely foreign to it. Thus we ſee that none of the general ſyſtems, common to all organs, enter into the compoſition of the epidermis: it has not the common baſis of all organized parts; and in this point of view may be regarded as inorganic. It ſeems to contain no fibre in its compoſition: it poſſeſſes very little power of reſiſtance, breaking under a ſlight diſtention, except in the ſoles and palms, &c. where it is ſo thick.

The action of air produces hardly any effect on it. When a large piece is expoſed, it becomes rather harder, and more conſiſtent, and is torn more difficultly. Next to the hair and nails, it is the tiſſue leaſt changed by deſiccation. It is rendered a little more tranſparent, but immerſion in water reſtores it to its former ſtate. When the ſkin paſſes into a ſtate of putrefaction, the cuticle is not at all changed. It is ſeparated from the cutis, but not rendered at all putrid; if it be thoroughly waſhed, it has no bad odour. When preſerved in moiſt air, it is not changed; and it may be regarded as the moſt incorruptible of animal ſubſtances, after the hair and nails.

Moiſture applied for a long time whitens the living cuticle, and throws it into numerous wrinkles. This effect is obſerved in the application of poultices, and ſeems to ariſe from the tiſſue becoming penetrated with the fluid; it takes place to the greateſt degree in the foot and hand, and often is hardly ſenſible in other parts. The ſenſibility of the ſkin is rendered more obtuſe by this change in the cuticle. The water imbibed by the part is afterwards evaporated, the wrinkles diſappear, and the cuticle recovers its former ſtate. When ſeparated from the body, and immerſed in water, it is whitened: it undergoes no putrid alteration, but is covered by a whitiſh pellicle formed of ſeparate moleculæ. At the end of two or three months it is ſoftened, and may be torn very eaſily, but does not ſwell: it is never reduced to a pulp analogous to that of other organs when macerated. Boiling never produces criſpation or corrugation of this tiſſue: prolonged ebullition renders it leſs reſiſtant, ſo that it may be torn very eaſily, but never reduces it to gelatine, nor gives it a yellow colour. The laminæ which compoſe it in the hands and feet are eaſily ſeparated after long boiling. The tanning principle has no action on it; nor has alcohol.

When well dried in the air, and expoſed to the flame of a candle, it undergoes no criſpation, as a piece of ſkin does when treated in the ſame way: it exhales a fetid odour analogous to that of burnt horn. It burns with great facility, ſo that if it be lighted at one end, it will often be entirely conſumed. A blackiſh fluid is obſerved in the flame, like that of burnt feathers. This is clearly of an oily nature, keeps up the combuſtion by its great abundance, and is found in ſo large a quantity only in the hair and nails: this produces a diſagreeable odour. A blackiſh coal remains after combuſtion. Light does not ſeem to affect the epidermis, which is not changed when expoſure to the ſun has altered the appearance of the ſkin.

Nitric acid turns it yellow, but diſſolves it with great difficulty. Sulphuric, on the contrary, when not much diluted, acts very powerfully on it, rendering it very thin and tranſparent, or diſſolving it entirely by long immerſion. Alkaline ſolutions diſſolve it, but with difficulty: pure alkali acts on it rapidly; as alſo does lime, according to Chaptal.

If, ſays Dr. Thomſon, the cuticle be tinged with nitric acid, the application of ammonia to it is well known to give it inſtantaneouſly a deep orange colour. Now, as Hatchett has ſhewn that this change is alſo produced upon coagulated albumen in the ſame circumſtances, and as the epidermis reſembles that ſubſtance in all the properties above detailed, it can ſcarcely be doubted that it is any thing elſe than a peculiar modification of coagulated albumen. Syſt. of Chemiſtry, v. 5, p. 574.

Properties.—It has very little extenſibility, as the ſmalleſt cutaneous tumour cauſes it to crack, and be detached in ſcales. Yet it is not entirely deſtitute of this property, as its elevation in bliſters proves. It has no contractility: when no longer diſtended, the portion elevated in a bliſter collapſes in wrinkles, and does not regain its original ſize. It has no animal ſenſibility in any part: it may be pricked, cut, torn, or injured in all parts without exciting any ſenſation. It differs from other organs, as cartilages, tendons, &c. which alſo have no animal ſenſibility, in being altogether unſuſceptible of that property, which they often acquire under certain kinds of excitement. The epidermis is equally deſtitute of the organic ſenſibility, and organic inſenſible contractility: it poſſeſſes no circulation, and is ſuſceptible of no diſeaſes, which depend on the organic properties. We have no proof, in ſhort, that it enjoys any vital powers at all; ſo that we may conſider the whole ſuperficies of the body as compoſed of dead matter. "Its life," ſays Bichat, "is extremely obſcure; I even doubt whether it can be ſaid to poſſeſs life. I am inclined to regard it as a ſemi-organized, or rather inorganic body, placed by nature at the point of communication between external dead matter and the living ſkin, and ſerving as a gradation between them."

The action of external bodies wears it away, and it is conſtantly reproduced. Scrape the ſurface with the blade of a knife, and an abundant greyiſh duſt will be detached. This matter accumulates in greater quantity, when the ſkin is not frequently waſhed; under ſuch circumſtances there is often a conſiderable layer.

It is reproduced very completely after being removed; and differs in that circumſtance from moſt other tiſſues. How this is effected has been a point greatly diſputed by phyſiologiſts; but the explanations have been entirely mechanical and unſatisfactory. That it is depoſited by the veſſels of the ſkin cannot be doubted; and we ſhall probably underſtand how the proceſs is effected, when we underſtand how the veſſels make bone, muſcle, nerve, &c. This reproduction only takes place on the ſkin: the thin pellicle covering the cicatrices of other tiſſues has a completely different texture. The different excreſcences affecting the cuticle, as corns, &c. reſult from the exerciſe of this reproductive power. They are all inſenſible, have no veſſels nor nerves, and poſſeſs the ſame conſiſtence and colour as the epidermis. External preſſure ſeems to promote their formation very powerfully; tight ſhoes produce corns; and much handling of heavy inſtruments in hard work produces the thick cuticular covering of the hand in blackſmiths and other mechanics.

The cuticle of the palms and ſoles is however originally thicker than that of other parts; this may be ſeen in the fœtus.

In the dead body the cuticle has a remarkable effect in preventing the evaporation of the fluids; none of which are diſſipated ſo long as this covering remains entire. If the body be expoſed in a high temperature, as of 100° or 120°, it does not ſeem to become dried; and where the limbs are diſtended in anaſarca, if it has not cracked, none of the fluid eſcapes. Remove the cuticle, and the cutis quickly becomes dry, tranſparent, and horny, and the ſubjacent parts are ſubſequently affected in the ſame way.

The epidermis is ſeen very clearly in the fœtus, where its developement is greater in proportion than that of other ſyſtems. It may be recognized when the ſkin leaves that pulpy ſtate which we have ſpoken of. At the end of the fifth month it is thicker in the palms and ſoles than in other parts. It appears to undergo no change at birth; but grows rather thicker afterwards as age advances. In the old ſubject it differs from that of the adult only in being ſubject to ſcale and crack, and thereby appearing dry and rough.

Internal Epidermis.—Moſt authors have admitted an epidermis on the mucous ſurfaces; and they have generally repreſented that this is the only part of the integuments that lines the mucous cavities. But a little examination will ſhew us that this expanſion forms only a ſuperficial ſtratum, and that if it be detached by hot water from the tongue, palate, &c. an organ analogous to the corion is left behind.

1. *Epidermis at the Origin of the mucous Surfaces.*—It is very diſtinct at all the origins of the mucous ſyſtem, at the glans, urethra, anus, naſal cavities, mouth, &c. It may be demonſtrated in theſe ſituations by the excoriations which ſometimes affect them, by detaching it with a fine lancet, by the action of hot water, by maceration, &c. It is much more delicate in theſe ſituations than where it covers ſkin, and becomes more and more ſo as it penetrates deeper. In theſe parts it is eaſily reproduced. It is deſtitute, like the exterior epidermis, of vital properties; and its nature ſeems to be in all reſpects the ſame; it yields the ſame reſults, when expoſed to the ſame agents.

2. *Epidermis of the more deeply ſeated mucous Surfaces.*—As we advance further into theſe organs, the epidermis becomes gradually thinner, and ſoon is no longer perceptible. The moſt delicate inſtruments and methods do not enable us to demonſtrate it in the ſtomach, inteſtines, urinary and gall-bladders, veſiculæ ſeminales, and the various excretory paſſages. No epidermis is elevated on the ſurface of theſe organs by boiling or maceration; nor by bliſters: nor is there any thing like a ſeparation of ſuch a covering in any diſeaſes. We ſhall be diſpoſed to conclude, from theſe conſiderations, that there is no cuticle on the deeply ſeated mucous ſurfaces, and that the large quantity of mucous fluids poured out in theſe ſituations ſupplies its place by protecting the corion from the impreſſions of noxious matters. The only circumſtance that could induce us to heſitate, is the occaſional ſeparation of ſubſtances like membranes, which might be regarded as exfoliations of an epidermis. Numerous examples occur in medical writers of ſuch matters being voided from the bladder, ſtomach, and inteſtines. On this ſubject we poſſeſs no very preciſe data.

The Nails.—We connect the hiſtory of theſe organs with that of the epidermis, as they adhere to it very ſtrongly, and come away with it in maceration. Their form in the human ſubject differs very much from that which they have in animals: they are generally thick and conical in the latter, thin and flattened in the former. They conſiſt of hard, tranſparent, and elaſtic plates, of a ſubſtance reſembling that of the horns of animals, covering the extremities of the fingers and toes on the aſpect of extenſion. Thus they are not adapted to purpoſes of offence, but are better ſuited to the ſupport of the broad ends of theſe members, which confer on the human ſubject a more perfect power of touch. Their length is limited by the univerſal practice of cutting them to a level with the end of the finger or toe: if left to themſelves, they are prolonged, and at the ſame time bent ſo as to cover the ends of thoſe parts. The natural limit of their growth ſeems to be that period at which they acquire a ſharp cutting edge: for they are then gradually worn away at the margin.

Three parts may be very eaſily diſtinguiſhed in the nail: a poſterior portion, covered on both ſides by integuments: a middle part, which is the moſt conſiderable, adhering by its concave, and unattached on its convex ſurface; and an anterior, free from adheſion in both reſpects.

The poſterior diviſion is about one-ſixth of the whole: it ends behind in a very thin ſerrated edge, by which the nail ſeems to grow out of the ſkin. This part is ſoft and flexible, and of a white colour: it is bounded by a ſtraight line, which, with the two margins, give to the organ a ſquare figure. The convex ſurface adheres intimately to the epidermis, which covers it in the following manner. The cutis terminates over the root of the nail in a ſemilunar edge, in front of which is a ſmall cavity adapted to, and filled by, the white part of the nail. Along the concavity of this creſcent the cuticle forms a ſmall and diſtinct fold, which may be cut without any feeling of pain, and which is reproduced. It adheres cloſely to the root of the nail, and is produced anteriorly for ſome length on its ſurface, unleſs it be cut away. Many deſcribe it as being continued over the whole convex ſurface. Behind it appears to be loſt in the ſoft and thin poſterior margin. Without the adheſion, which connects the ſemilunar border of ſkin to the nail, there would be a ſpecies of cul-de-ſac between theſe parts. Some have conceived that the extenſor tendon reaches to the poſterior edge; but its termination at the tubercle of the laſt phalanx is very diſtinct; and there is a ſpace of two or three lines between this and the nail. The concave ſurface of this poſterior diviſion adheres in the ſame way as that of the middle part.

The convex unconnected ſurface of the middle diviſion is ſmooth, whitiſh behind for a ſmall ſpace terminated by a ſemicircular edge, and red in the reſt of its extent in conſequence of the colour of the ſubjacent parts. On the ſides it is covered a little by the ſkin, which is continuous with the ſemilunar projection already deſcribed. The fold of cuticle is alſo continued, and adheres to the margin of the nail. The concave ſurface of this part is laminated longitudinally, and the plates end in very thin and membrane-like edges; but this laminated texture does not extend to the white part. The organization may be well ſeen in the hoof of an animal, as the horſe; where the plates are of conſiderable breadth and number.

The edge of this concave adhering portion is fixed in front by the epidermis, which, after covering the extremity of the finger, is attached to the ſurface of the nail at the front end of its laminated portion, in a curved line; here again it ſeems to be confounded with the ſubſtance of the nail.

The looſe anterior portion, the length of which is limited by cutting, is manifeſtly thicker than the middle and poſterior parts. Indeed the thickneſs, hardneſs, and reſiſtance of the organ increaſe gradually from behind forwards.

At the attachment of the nail, the ſkin is marked by a deep parabolical groove, in which the former is received: the fold, which bounds this groove behind, overlaps the white part of the nail, covers a conſiderable portion of it, and adheres firmly to the poſterior thin edge. From this hollow the cutis is produced over the poſterior ſurface of the laſt phalanx to the end of the finger, between the nail and the bone, and adheres cloſely to the perioſteum. At the ſides and in front it is continuous with the common ſkin. In this ſituation it has a peculiar organization; it becomes ſofter and redder, has more numerous veſſels, and is diſtributed in longitudinal laminæ, correſponding to, and received between, thoſe of the nail. But the portion of ſkin correſponding to the white part of the nail, is alſo different in its colour, and not laminated on its ſurface. From this part numerous fine and long papillæ or villi ariſe, and are received into correſponding hollows of the nail: the ſame ſtructure exiſts more or leſs over the whole ſurface covered by the nail. It appears that the organ grows principally from the white part: at leaſt, if a mark be made towards the root, it gradually advances to the looſe edge, coming more and more forwards until it entirely diſappears. The papillæ of this part give to the organ a very exquiſite ſenſibility: hence the acute pain of paronychia, and of that barbarous practice of tearing off the nails.

Organization and Properties of the Nails.—Theſe can be moſt advantageouſly obſerved in the larger ones, as thoſe of the thumb or great toe. A ſingle lamina occupies the whole convex ſurface; this exiſts alone at the poſterior edge, and hence the thinneſs of that part. New plates are ſucceſſively added on the concave ſurface towards the front, ſo that the organ becomes ſucceſſively thicker and thicker: they may be eaſily removed in ſeparate ſtrata, and are ſhorter and ſhorter as they are placed more and more towards the front.

Theſe laminæ, compoſing the nails, ſeem to be in their nature nearly identical with the epidermis. The moſt ſuperficial is manifeſtly continuous with that organ by its edges. The nails may be detached and are regenerated exactly as the cuticle is. Their vitality is as obſcure as that of the cuticle: they exhibit no trace of animal ſenſibility, nor of any organic property. When burnt they cauſe a diſagreeable odour like that of the epidermis, and exhibit altogether the ſame phenomena. Mr. Hatchett conceives that they conſiſt, like the cuticle, of coagulated albumen. They contain a little phoſphate of lime. Maceration and coction do not, however, produce in theſe organs the ſame want of conſiſtence or kind of brittleneſs which they do in the epidermis, on account of their greater ſolidity. The action of acids preſents nearly the ſame phenomena. Thus, on the whole, the compoſition, organization, and properties of the nails and epidermis ſeem to be perfectly analogous: they make up together a perfect inſenſible covering to the cutis, a ſtructure void of vital properties, and therefore exerciſing no vital functions. The only differences between them ſeem to be modifications of form and arrangement ariſing from the uſes of the parts which they cover. Phyſiologiſts aſſign to the nails the office of ſupporting the ſoft ends of the fingers by which the ſenſe of touch is exerciſed, affording to the papillæ a point of reſiſtance, and protecting them from external violence. They are alſo ſuppoſed to enable us to graſp objects more firmly, and to take up minute bodies more conveniently.

Developement of the Nails.—While the ſkin is ſtill pulpy in the fœtus, the nails poſſeſs conſiderable firmneſs, but are very thin. Their length at the time of birth is not proportionate to what they acquire afterwards; they do not exceed, and frequently do not reach the ends of the fingers. At this time their tranſparency enables us to obſerve the livid colour of the venous blood circulating before reſpiration, and to obſerve how it is ſucceeded by the redder arterial fluid. After birth they increaſe as the epidermis does; and they become extremely thick in old perſons.

Of the Hair, (Syſtême Pileux of Bichat.)—The human frame poſſeſſes much leſs of this covering than that of animals: the contact of external bodies with the ſkin being in great meaſure intercepted in the latter, the animal ſenſibility of the cutaneous organ muſt have much fewer external relations in them, and conſequently perform a much leſs important part. In animals the reproductive and digeſtive functions ſeem to be the principal ſources of pleaſure.

1. *Hairs of the Head.*—The ſyſtem predominates in this part, covering the cranium nearly as the bodies of animals are covered. For this reaſon, as well as on account of its convex form, which allows it to come in contact with bodies by a ſmall ſurface only, it is very little capable of acting as an organ of touch. The face is leſs generally covered, excepting one part in the male ſex. This portion of the body, in which moſt of our means of communication with external objects, as the organs of ſight, ſmell, and taſte are aſſembled, is not favourable in its form to the exerciſe of touch. The elongated ſnout of moſt quadrupeds enables them to touch external objects, to turn and move them in various directions, as well as to ſeize them for food: in man the former functions are exerciſed by the hands.

The boundary of the hair towards the front is very variable in different individuals: and theſe varieties influence the breadth and apparent height of the forehead; the direction of this part is dependent entirely on the bony ſtructure. Hence the hair influences but ſlightly the expreſſion of the figure: we attach the ideas of majeſty and grandeur leſs to the breadth of the forehead, than to its perpendicular direction. The number of the hairs in a given ſurface is ſingularly variable: they may be ſo cloſe as to touch in every point, or may leave intervals in which the ſkin of the cranium is viſible. We hardly know the natural extent of their growth. They will ſometimes become ſo long as to touch the thighs or even legs; and this circumſtance, like a crowd of others, tends to prove the deſtination of the human ſubject to the erect attitude. It has been queſtioned whether the practice of cutting them produces any phyſiological effect; whether the conſtant growth, rendered neceſſary by this practice, be performed at the expence of any other parts or functions.

The ſtrength of the hair is very conſiderable in proporto its ſlender bulk: no part in the animal economy, not even the fibrous ſyſtem, will ſupport ſuch conſiderable weights. Ropes made of hair would therefore be very uſeful, if they could be procured of ſufficient length.

Smooth and ſtraight hair grows to the greateſt length; in proportion as it is curly it is ſhorter, of which the woolly kind in the negro is a remarkable example. The colour varies in the different races of mankind, and thus becomes a characteriſtic attribute in the natural hiſtory of the ſpecies. But it varies no leſs in the different individuals of the ſame ſpecies; and theſe varieties follow the ſame general rule with that which regulates the colour of the ſkin and eyes. Hence theſe differences are to be conſidered in enumerating the characters of the different temperaments.

The eyebrows and eyelaſhes are deſcribed under the article EYE. The hair compoſing the beard, which we have alluded to in the article GENERATION, as one of the ſexual diſtinctions of the male, is ſhorter than the covering of the head, and longer than any other hairs in the body: it is always more or leſs diſpoſed to curl, is ſtronger and leſs greaſy than the hairs of the head. It generally follows their colour; but very often deviates into the red tint. Its quantity varies ſingularly in different individuals: common opinion aſſociates the idea of ſtrength to its abundance, particularly if it be black. For ſome remarks on the effects of cutting it, ſee HAIR.

2. *Hairs of the Trunk.*—Their quantity is expoſed to very great variations; ſome being almoſt covered, while others have the ſurface perfectly ſmooth. They are much more numerous in front than behind: and in the former ſituation abound chiefly on the cheſt, and in the courſe of the linea alba in men. There are none on the thorax in women, who have altogether but few on the trunk. A conſiderable collection, reſembling the beard in its nature, is found about the generative organs in both ſexes. Theſe are very ſeldom light in colour, frequently approaching to red, and very commonly black. This increaſe of the hairy ſyſtem is almoſt peculiar to the human ſubject. Its quantity varies very greatly.

3. *Hairs of the Extremities.*—Theſe organs are for the moſt part covered: the number of their hairs is nearly uniform in moſt individuals, but the length differs greatly. In the hollow of the axilla, a ſmall collection occurs reſembling thoſe of the genital organs: but there is nothing like this in the lower limbs. The inner ſurface of the arm and fore-arm has none of this covering in moſt men: but the lower limbs are more uniformly covered; the back of the foot and hand are conſtantly covered, but the palms and ſoles, and correſponding ſurfaces of the fingers and toes, are always perfectly ſmooth. The latter circumſtance ſeems to contribute to the pefection of the organ of touch.

On the organization and mode of growth of the *hair*, the reader is referred to that article.

Properties of the Hair.—It experiences but a ſlight corrugation from the action of heat, but it is twiſted or curled in various directions: moiſture makes it ſtraight again. It hardly poſſeſſes any extenſibility or contractility. Whether they have any vital properties is a ſubject of diſpute: at all events they are exceedingly obſcure. We are diſpoſed to deny their exiſtence in this ſyſtem, as well as in the epidermis and nails. Bichat, who, for ſome of the reaſons explained in the article HAIR, conceives that they are the ſeat of vital proceſſes, adds, "we cannot however deny, that in the natural ſtate theſe organs come next to the epidermis and nails in poſſeſſing the leaſt active life, and having the feweſt relations to other organs. While all other ſyſtems are deranged by diſeaſe, this is generally unaffected; the hair grows as uſual, and ſeems not to experience the ſlighteſt diſturbance; its mode of exiſtence is, therefore, quite different from that of other ſtructures."

Mr. Hatchett concludes, from his experiments, that hair contains gelatine, and owes its ſuppleneſs and toughneſs to that matter. This may be ſeparated by boiling it in water, after which it is much more brittle. If the proceſs be continued for a long time, the hair crumbles in pieces between the fingers. The portion inſoluble in water poſſeſſes the properties of coagulated albumen. Vauquelin obtained a ſolution of human hair in water, by raiſing the temperature of the fluid in Papin's digeſter. When the heat was too great, it was decompoſed, and ammonia, carbonic acid, and an empyreumatic oil formed. Sulphuretted hydrogen is always evolved, and its quantity increaſes with the heat. The ſolution of hair effected in this way contains a kind of bituminous oil, which is depoſited very ſlowly. The colour of this oil correſponds with that of the hair. Filtration allows a colourleſs fluid, in which copious precipitates are formed by infuſion of galls and oxymuriatic acid, to paſs through. Silver is blackened by it, and acetate of lead precipitated brown. Though very much concentrated by evaporation, it does not concrete into a jelly. Water, containing four *per cent.* of potaſh, diſſolves hair with an evolution of hydroſulphuret of ammonia. A thick oil, differing in colour according to that of the hair, with ſome ſulphur and iron, remains undiſſolved. Sulphuric, muriatic, and nitric acids diſſolve it: with the latter an oil is ſeparated. Oxymuriatic whitens, and then reduces it to a ſubſtance of the conſiſtence of turpentine. Alcohol, digeſted on hair, extracts from it two kinds of oil: the firſt is white, and ſubſides in white ſhining ſcales as the liquor cools; the ſecond varies according to the hair employed: it is greyiſh-green when black hair is uſed, and as red as blood when red is employed. When incinerated it yields iron and manganeſe, phoſphate, ſulphate and carbonate of lime, muriate of ſoda, and a conſiderable portion of ſilica. The aſhes of red hair contain leſs iron and manganeſe; thoſe of white hair ſtill leſs, but they contain magneſia. The aſhes do not exceed 0.015 of the hair. According to the above experiments, performed by Vauquelin, black hair is compoſed of the nine following ſubſtances; 1, an animal matter, which conſtitutes the greateſt part; 2, a white ſolid oil, in ſmall quantity; 3, a greyiſh-green oil in greater abundance; 4, iron in an unknown ſtate; 5, oxyd of manganeſe; 6, phoſphate of lime; 7, carbonate of lime, in very ſmall quantity; 8, ſilica; and 9, ſulphur. Thomſon's Syſtem of Chemiſtry, book v. chap. 2. ſect. 7.

Developement of the Hair.—In the firſt months none can be perceived. When the fibrous part of the cutis begins to be perceptible, we ſee a ſlight down on the head, concealed, in great meaſure, by the white unctuous matter. The colourleſs down begins to aſſume ſomething of the tint which the hair will have after birth, but it is in all caſes pale till birth, when it may be half an inch long on the head, although it is only in the ſtate of down in any other part. It grows much more rapidly after birth than before; but is always comparatively lighter in colour in proportion as the ſubject is younger. The age of puberty witneſſes a remarkable change in this ſyſtem in the developement of the beard, of the hair about the organs of generation, and in the axillæ. It undergoes very little change in the following years; but is ſaid to grow more rapidly in ſummer than in winter. Towards the end of life the hairs feel that general obliteration which affects all the exterior veſſels: it ceaſes to receive colouring matter, and becomes grey. On the ſubject of this change, ſee Hair. After remaining grey for ſome time they fall off, and the bulbs ſhrink and diſappear. Bichat found no traces of the latter parts in the integuments of perfectly bald old men: but they were entire in the caſe of a man who had loſt his hair from a putrid fever.

It has been very generally ſuppoſed that the hair, nails, and epidermis continue to grow after death: but we have no very accurate obſervations on this ſubject. Bichat ſaw the fact in a cloſely ſhaven head macerated for eight days: and there is no greater difficulty in admitting this than in allowing that the abſorbing veſſels can continue their action at the ſame time. The growth of the hair does not ſeem to go on at a rate proportioned to the degree of living power: it is as rapid in caſes of proſtration as in thoſe where theſe forces are augmented.

Bichat, Anatomie Generale, tom. 4. Haller, Elementa Phyſiologiæ, lib. 12. Cruikſhank on the Inſenſible Perſpiration.

Integument is alſo extended to the particular membranes which inveſt certain parts of the body; as the coats or tunics of the eye.

INTELLECT, a term uſed among philoſophers, to ſignify that faculty of the ſoul uſually called the *underſtanding*.

The Peripatetics make two kinds of intellect; *active* and *paſſive*. See Idea.

INTELLECTUAL Education, is that branch of education which reſpects the underſtanding, conſidered in diſtinction from the affections and diſpoſitions. By intellectual education we underſtand that ſeries of means by which the various powers, which may be called the intellectual powers, are cultivated; by which thoſe habitual qualities of mind are produced, which immediately reſpect the acquiſition of knowledge, or are eſſentially auxiliary to it; and by which the mind is ſtored with thoſe ideas which are ſubſervient to ſcientific acquirements, or to the arts and purſuits of life.

The full conſideration of theſe objects would lead to three primary diviſions of this branch of education: firſt, the cultivation of the ſeveral intellectual powers and qualities; ſecondly, the value and mode of cultivation of the different branches of knowledge; and thirdly, the peculiar culture of mind and intellectual acquiſitions requiſite for the different ſexes, claſſes, and profeſſions. In a field ſo wide, it is neceſſary to make ſome ſelection. In our preſent article we ſhall chiefly confine ourſelves to a brief conſideration of the culture of the leading intellectual powers and qualities. The laſt of the three diviſions (which will include ſome remarks claſſing under the ſecond), would in ſome meaſure lead us to anticipate what more properly comes under the head of Moral *Education*; and we ſhall therefore leave the conſideration of it to that article, for which alſo we ſhall, for the ſame reaſon, defer a comparative view of the advantages of public and private education.

Though it is not our buſineſs, in this department, to enter into the ſubject of mental philoſophy, yet, as in a work ſo extenſive as the preſent, the ſame arrangement, views, and employment of terms cannot be expected throughout, we ſhall find it at leaſt expedient to ſay more reſpecting the ſeveral powers of the mind than might be in any way requiſite, if we were poſſeſſed of what will be brought forwards in a more direct form, under its appropriate head: independently of which conſideration, we ſhould be induced to give ſuch general views of the intellectual powers as are neceſſary, in order to underſtand the principles of education, by the hope that thus we might be the means of exciting the attention of ſome of our readers to a branch of knowledge which is of peculiar importance, not only in the education of others, but in the cultivation of our own minds.

The firſt of the intellectual powers in the order of developement is of courſe ſenſation (or leſs ambiguouſly the ſenſitive power); by which is meant that power or capacity of the mind, by whoſe operation it receives ſenſations from things which affect the organs of ſenſe. Proceeding in the ſame order, we next find the retentive power, without which ſenſations would be of no avail: this is the power or capacity of the mind, by which it retains relicts of ſenſations or ideas. Next ſucceeds the aſſociative power, which is that power or capacity of the mind by which it connects and compounds ideas. This laſt principle, if not the ſole cauſe of all our mental phenomena (except the origin of ſenſations, and the retention of the ſimple uncompounded relicts of them), has ſome effect in the origin and modification of all of them. It is owing to this important principle that ſenſations become the ſigns of thoughts and feelings, by which means man becomes a ſocial being; that the whole mental furniture of perceptions, notions, affections, paſſions, ſentiments, emotions, &c. is formed from the ſimple relicts of ſenſation; that man, from mere ſenſation, riſes to intellect. In ſhort, whatever mental operation we attend to, except at the very earlieſt period of mental culture, we find aſſociation the cauſe of its productions, or intimately concerned in it.

Theſe three powers may be conſidered as the elementary powers of the mind, to the operation of which all intellectual phenomena may be referred; but as it is under peculiar modifications and combinations that we ſee them act, this ſummary diviſion would be inſufficient for our purpoſe. We ſhall therefore follow in the order which we find moſt convenient, a ſomewhat more minute diviſion of our intellectual principles, according to the combinations, or peculiar modes of operation, of the ſimple powers; *viz.* ſenſation, perception, obſervation, attention, abſtraction conſidered both as a habit and as a power, memory, underſtanding, and imagination.

1. *Senſations* are the rudiments or elements of all our ideas, that is, of all our thoughts and feelings. When an infant enters into the world, there is no appearance whatever which can authorize any one to aſſert that there are ideas in its mind; and no one can reaſonably doubt, that if a human being could be deprived of all his organs of ſenſation, before any ſenſations had been received, that he could never have ideas. In the earlieſt exerciſe of the capacity of ſenſation, ſenſations are ſimple, uncompounded with the relicts of former correſponding ſenſations; but the ſenſations very ſoon become perceptions, that is, they inſtantaneouſly recal the relicts of other correſponding ſenſations. That ſenſa-

tions, in a ſomewhat advanced ſtate of mental culture, are uſually perceptions, any perſon may ſatisfy himſelf, by conſidering that ſenſations are uſually accompanied either with an idea of an external object cauſing them, or (if they are merely the effect of the ſtate of the bodily ſyſtem) with an idea of the ſenſation being in that part of the body, in which the cauſe of the ſenſation exiſts ; both of which are complex ideas, formed from a great number of impreſſions, and which could in no inſtance be produced by any exertion of the ſenſitive power alone, but neceſſarily require the exerciſe of the retentive and aſſociative powers.

Conſidering man as an intellectual being, the correctneſs and extent of his perceptions are of the firſt moment. They are, in fact, the materials of all knowledge reſpecting external objects ; and in the early ſtages of mental culture are the only objects of the underſtanding. Now, the correctneſs and extent of the perception depend upon the vividneſs and efficaciouſneſs of the component ſenſations, and the number of them received from the ſame or ſimilar objects in different ſituations, and through the medium of different ſenſes. One leading object, therefore, in the education of the human being, ſhould be to invigorate and exerciſe the organs of ſenſe. Independently of the effects of the general healthineſs of the ſyſtem, it appears decidedly probable that the organs of ſenſe are capable of being improved by proper exerciſe. It is a grand law of our frame, that moderate exertion increaſes the power of exertion ; and there are facts which lead to the ſame concluſion in this particular caſe. But this may be ſafely left to the natural effect of varied exerciſe. What is principally to be done is, to afford children the opportunity of exerciſing their ſenſes on a variety of objects, and in a variety of ſituations. We ſhould think it deſirable to proceed a little farther on the cultivation of the organs of ſenſation ; but ſome obſervations on this ſubject will properly form a part of what we ſhall have to ſay under the head of PHYSICAL *Education*.

II. By the law of aſſociation, many ideas, received directly from ſenſible objects, through the medium of different ſenſes, become connected, and at laſt blended together, ſo as to form one very complex, though apparently uncompounded, idea; and this complex idea is often recalled to the mind by a correſponding ſenſation ; and by aſſociation it becomes ſo connected with that ſenſation, that the complex idea itſelf is often miſtaken for a part of the ſenſation. For inſtance, the ſenſation produced by the impreſſion made by a globe on the ſenſe of ſight, is, as can be proved, nothing more than that produced by a circle, with certain variations of light and ſhade : yet, immediately on the ſenſation being received, the ideas of the ſolidity of the object, of its hardneſs, of its magnitude, and of its being ſomething external to oneſelf, (all of which have been derived from the ſenſe of touch, in connection with this object, or others in ſome reſpect ſimilar,) immediately riſe up in the mind in one blended form ; by their complete coaleſcence they appear to be one, and by their immediate and conſtant connection with the ſenſation, they appear to the mind as a part of the ſenſation. The ſenſation thus connected with the complex idea is the perception : and by the faculty of perception we underſtand that compound power (or rather combination of powers) by which perceptions are received from external objects. The accuracy and vividneſs of the ſenſation depend upon the ſenſitive power and its organs : the accuracy and vividneſs of the perception depend partly upon the accuracy and vividneſs of the component ſenſations, and partly upon the activity of the retentive and aſſociative powers. Suppoſing the powers of ſenſation to be in a ſound and vigorous ſtate, yet it is obvious that the perceptions will vary very greatly in different individuals, and in the ſame individual, at different periods. The perception is in fact the ſum total of all the notions which the individual has of the object. How much the perceptions of the ſame object vary in different individuals, may be underſtood from a ſimple inſtance. Suppoſe a watch to be ſubjected to the obſervation of three perſons, whoſe organs of ſenſe are alike healthy and vigorous, the one a very ignorant perſon, totally unacquainted with its purpoſes and movements ; the ſecond a well-informed perſon, not however poſſeſſed of any acquaintance with the particular mechaniſm ; the third an artiſt, minutely and completely acquainted with it : the ſenſation may be preciſely the ſame in all inſtances ; the picture upon the retina may convey to the mind an equally impreſſive notice of the object ; but how different the perception ! The firſt ſees a number of minute objects, which attract his attention perhaps by their beauty and regularity ; but nothing more : he has no idea of their ſubſerviency to each other or of their general uſe ; there is little more in his caſe than ſenſation, indeed we may ſay, nothing more than ſenſation beſides thoſe aſſociated perceptions which ſo ſoon become connected with every impreſſion from external objects, and to which we have already referred. The ſecond, from his general knowledge of mechaniſm, has ſome ideas excited by the ſenſation of uſe and connection, but he cannot diſcern the ſpecific kind of connection, nor how each part tends to anſwer the end of the whole. If he ſets about to ſtudy the mechaniſm, he ſubjects each part to minute examination in its ſtructure and connections ; and by degrees may acquire an acquaintance with the whole, which, on a ſubſequent inſpection, would give him an immediate, diſtinct perception of the parts and purpoſes. What he thus acquires by laborious and patient examination, the third ſaw at once. His perceptions have long been cultivated by daily attention to the movements and their dependencies, by ſtudying their defects and excellencies, by the actual formation of various parts, and the conſtruction of the whole : and a great number of the ideas produced by ſuch obſervations and operations, become ſo intimately united with the ſenſation, that at laſt this at once excites them, and thus he ſees (or, more correctly, perceives) what lies totally out of the reach of the obſervation of others.

From this brief account of the perceptive power, we may readily derive the moſt eſſential conſiderations as to its cultivation. To render the ſenſations efficacious in forming diſtinct ideas, and to connect theſe ideas already derived from any object with the new impreſſions, depends principally upon the degree of attention (or fixed direction of the mind) which the ſenſations receive. Hence thoſe who have the care of infants and young children, ſhould give them every opportunity to keep their attention directed to the objects of their ſenſes ; and every means ſhould be employed to lead them to ſuch attention. An infant, intently gazing upon an object, or examining it with its little hands and lips, is as uſefully employed in the cultivation of intellect as the fondeſt parent can wiſh. In the early periods of mental culture there is, however, more to be done in this connection by allowing a child full ſcope for its own efforts, than by any direct exertions which can be made by others. When its attention is fixed upon any object, let it remain ſo ; if poſſible let the objects of ſenſe be brought into view under different aſpects, and expoſed to the examination of different ſenſes. Before words become to a child the ſigns of voluntary action, all that can be done is to expoſe it to ſenſations, and to allow them to fix the attention; but afterwards more direct efforts may be made, and the attention may be fixed by various other means beſide the mere action of the ſenſations themſelves.

Children of quick ſenſations, for the proper cultivation of the perception, require to be frequently induced to obſerve minutely the objects of perception. We do not venture to go ſo far as to aſſert, that it is of no conſequence what they obſerve, provided that they do carefully obſerve it; but there can be no heſitation in ſaying, that when the ſenſations are conſtitutionally vivid, every inſtance of cloſe obſervation given to objects which are within the ſcope of the comprehenſion, is cultivating the perception, and contributing to the ſtock of materials on which the higheſt efforts of the underſtanding are to be exerciſed: and however trifling, in common eſtimation, thoſe objects may be, yet the mind is receiving a uſeful employment, and every thing is going on as effectually as could be wiſhed. It is a moſt erroneous idea in education, that nothing is done except when children are engaged in the uſual rudiments of inſtruction. A child watching the motions of objects around, obſerving their figure and ſounds, examining their ſtructure, is employed in a work which it ſhould be our aim as much as poſſible to aid and encourage, and from which we may expect very valuable reſults both on the faculties and furniture of the mind.

The leading point with reſpect to thoſe whoſe phyſical ſenſibilities are lively, is to engage them to ſteady obſervation of the objects of perception; with reſpect to thoſe whoſe ſenſations are by their conſtitution dull, our efforts muſt be directed to the awakening of the perceptive power. Whatever is found to ſtimulate the mind to the exerciſe of the power, muſt there be employed. It does not much ſignify in this caſe whether, in the firſt inſtance, we ſucceed in producing ideas which will be permanently uſeful; if the perception is exerciſed, it will become more vigorous, and by degrees the original dulneſs of ſenſation may be in ſome meaſure remedied, by the influence of aſſociated feelings. But, in general, dulneſs of perception does not ariſe from dulneſs, and ſtill leſs from deficiency, in ſenſation; but from the inefficient employment of the organs of ſenſe. Many lively children are found to be dull in their perceptions; and on the other hand, children whoſe phyſical ſenſibilities are far from vivid, ſee what their companions ſee not, and hear what they hear not: the former glance over, and ſee at a glance, the moſt impreſſive objects, or features of an object, but the more minute parts, or the leſs prominent, and brilliant objects, they do not ſtay to notice, and though theſe affect the organs of ſenſe, they make no impreſſion on the mind; the latter more readily dwell on the objects of their ſenſations, which allows the various parts to call up aſſociated ideas, and in other ways to affect the mind, and thus to make their ſenſations efficacious.

III. The habit of accurate *obſervation* depends, in a great degree for its foundation, upon the manner in which the perceptive power has been early cultivated, while at the ſame time it invigorates the perceptions: indeed, in ſome points of view, it may be regarded ſimply as the employment of the perceptive power. This habit depends alſo, eſpecially for its utility, upon the cultivation of the judgment, and upon the aſſociations which become connected with the objects of ſenſe. A child obſerves, in the firſt inſtance, becauſe the notice of the mind is excited by the pleaſure or pain accompanying the ſenſation; afterwards alſo, through the influence of external motives, that is, aſſociated pleaſures or pains. When the underſtanding is ſo far developed as to perceive the uſes of different objects, this again increaſes the motives to obſervation, and makes it ſubſervient to much valuable cultivation of the intellect. Every fact which is intelligible and intereſting to a child reſpecting the objects of perception, excites the notice of the mind to thoſe objects, at the ſame time that the communication, reception of it in the mind, and repetition of the *ideas*, increaſes the ſtock of knowledge, and exerciſes the memory and judgment, and often the reaſoning powers.

Yet here, as in every branch of education, by aiming to do too much, we may make our beſt directed exertions ineffectual. To obſerve with effect, requires patient and frequently repeated attention. To obſerve is not merely to ſee, but to ſee ſo as to perceive *that*, whatever it be, of which the ever active principle of aſſociation has made the viſual ſenſation the ſymbol or index; and the more the obſervation is well employed, the more will be brought into the view of the mind by thoſe ſenſations which to another would not lead on one link in the chain of thought. To force the obſervation is therefore impoſſible. We may make our children parrots, by giving them words; but the growth of ideas muſt be gradual. The obſervation muſt firſt be employed upon directly ſenſible qualities alone; the more theſe are noticed, and the ideas of them aſſociated together, (in other words, the clearer the perceptions,) the better foundation is laid for future knowledge. By degrees, and as it is perceived that the mind will bear it, thoſe circumſtances and qualities which imply ſome of the ſimpleſt exerciſes of the underſtanding, ſhould be brought into view; and from theſe the ſkilful inſtructor (or rather inſtructreſs, for we preſume that in general the early intellectual education is chiefly conducted, as it will be beſt conducted, by the female ſex) will proceed to others which are ſtill more remote from mere ſenſation. It will uſually be found that children who have been educated in the country, or have had continual opportunities of being in fields and gardens, (other things being equal,) acquire much more completely the habit of obſervation than thoſe who have been bred up in large towns. In the works of nature there is much more than in the works of art to excite the obſervation of children, much more in general than can be made the ſubjects of pleaſing inſtruction; but the judicious parent will not be at a loſs to find numerous objects within-doors to excite the obſervation and exerciſe the perceptive powers; and provided that the obſervation is actively employed, and correct perceptions are acquired, the mental culture in this eſſential point is ſucceſsfully going on.

The habit of obſervation depends in part upon the general culture of the mind, eſpecially upon the aſſociated thoughts and feelings connected with external objects. The poor plough-boy, with all the advantages that his ruſtic employments afford him for the excitement of his obſervation, will often be found extremely deficient in that habit; his perceptions are dull, and his mind is ſcarcely awakened. Senſations often repeated, without any aſſociations being formed with them, ceaſe to excite the notice of the mind; and where the work of inſtruction has been totally neglected, as unhappily it ſo often is among the poor in country ſituations, the noble powers of the mind lie dormant; there is nothing to rouſe its capabilities ſeparate from the narrow round of the daily employments; theſe ſoon become mechanical and ceaſe to excite its exertion; and as far as intellect is concerned, the ſituation is ſurely leſs favourable than that of the untutored ſavage, whoſe ingenuity and obſervation are ſtimulated by the neceſſities of life.—As the mind, therefore, is capable of receiving them, ſuch ideas ſhould be communicated in connection with the objects of ſenſation as are calculated to keep up the intereſt which the mere ſenſations at firſt excite ; and thus to continue that attention to them which may gradually render the obſervation habitual.

It will not be ſuppoſed that we would wiſh the obſervation to be cultivated, to the excluſion of reflection ; the two habits of mind are not in any reſpect in oppoſition, in the early periods of education ; but, on the contrary, the one materially aids the other. The reflection may be well and ſucceſsfully exerciſed upon the ideas which have been left by the abſent objects of ſenſe ; and indeed it is only upon theſe that, at firſt, it can be properly exerciſed. If this be done, the intereſt by which the obſervation is ſtimulated will be kept up ; and, what is not leſs important, the employment of the obſervation will be rendered effectual, and will afford materials for after-reflection. The exerciſe of thought reſpecting the occurrences of the day, reſpecting thoſe things which have been the ſubject of direct obſervation, in ſhort reſpecting any object of ſenſation, is in various points of view of great value ; and the more this is employed, the more the mind is prepared for farther obſervation.

Nevertheleſs, the period of childhood is more the period of obſervation than of reflection (or ſteady attention to our own thoughts and feelings) ; and it is the former that, in the preparatory parts of education, we ſhould make the primary object. It is of eſſential value in every branch of education, and in every department of life. The ſucceſsful acquiſition of every ſcience depending upon experiment ; indeed the acquiſition of knowledge of every kind which depends upon the exerciſe of the perceptive power, the cultivation of the taſte, the common concerns of life, the intercourſes of civility, and the efforts of benevolence, require the conſtant exerciſe of the habit of obſervation ; and ſo long as the obſervation of a child does not reſt merely with the immediate objects of perception, but continues to connect with them that information which the inſtructor communicates, or which has been derived from paſt obſervation, it is very uſefully employed. Whatever method is found to invigorate and correct the obſervation, ſhould be frequently made uſe of ; till the underſtanding has made conſiderable progreſs, this ſhould be a leading object in the intellectual culture ; and in every period of it, the habit ſhould be frequently brought into exerciſe. By a proper cultivation of it, the memory and judgment are directly cultivated ; and while it ſtrengthens and rouſes the energy of the mind, it furniſhes it with ſome of the moſt ſerviceable materials for the underſtanding and imagination.

Thoſe who have been at all engaged in the buſineſs of education, well know in what different degrees accuracy and quickneſs of obſervation are found, and how important it is for the progreſs in intellectual acquirements, and often for the moral culture, that the habit ſhould be early and ſteadily cultivated : and we here wiſh to expreſs our decided opinion, that the character of the intellect and affections, however much it may be modified by future cultivation, receives its ſtamp from the employment of the firſt few years of life ; that the education of the nurſery is of almoſt incalculable moment in the mental and moral culture ; that by the neglect of it, years of labour may be rendered requiſite to compenſate in ſome degree for it ; and that by a proper attention to it, a foundation is laid for a clear and vigorous underſtanding, and lively and pure affections.

IV. *Attention* is an eſſential conſtituent part of the habit of obſervation, and is neceſſary to every obſervation of the mind in its firſt ſtage. Many corporeal, and even mental operations may, when become thoroughly habitual, go on without exciting the attention of the mind : and this we have no heſitation in ſaying, notwithſtanding the great authority of Dugald Stewart to the contrary : but this is not the place for the diſcuſſion of this point ; and what more immediately concerns our purpoſe is, that before any operation of mind is become habitual, the exerciſe of it requires the direct notice of the mind, that attention is requiſite to render ſenſations efficacious, that every exerciſe of the underſtanding requires it, and that the habitual power of employing it in the direction which the judgment points out, may be regarded as what is moſt neceſſary for the attainment of the higheſt degrees of intellectual culture. In this perfect ſtate it is very rarely to be met with ; but in a conſiderable degree it is frequently acquired ; and ſome good portion of it is ſo important in every ſtage of the mental progreſs, that the formation of the habit cannot be begun too early, nor the cultivation of it made too ſteady an object.

Attention is now not unfrequently ſpoken of as a diſtinct faculty of the mind ; and the philoſopher to whom we referred in the preceding paragraph has greatly contributed to this change of nomenclature, if he did not begin it. It may perhaps be regarded as a mere verbal diſtinction if we deny it the appellation ; but, in fact, it appears to be, in its ſimple ſtate, merely the notice of the mind, which in various inſtances is involuntary, but which by degrees may be connected with volition, and directed by habitual tendency, or direct motives, even in oppoſition to the ſtrongeſt impreſſions from external objects. We may very correctly ſpeak of the power of the mind over its attention, and, by abbreviation, of the power of attention ; but the true point of view in which the attention is to be regarded, both when it can be fixed by ſtimuli of different kinds without the direct intervention of volition, and when it is capable of being produced by direct volition, is as a ſtate or habit, which we would in the one caſe ſpeak of ſimply as a ſtate or habit of attention, in the other as the habit of voluntary attention. In very young children the attention is entirely involuntary ; the ſenſible excitements of various kinds which we employ attract the notice of the mind ; and the attention is directed to the moſt impreſſive excitement. This is very much the caſe in every ſtage of education ; but under judicious management the ſtate of mind which we call attention may be early produced by the influence of motives without ſenſible ſtimulus ; and the foundation is then begun for the habit of voluntary attention.

The attention produced by ſenſible ſtimulus begins even with the very firſt ſenſation which is received. It is a beautiful proviſion of Providence, that ſenſations which give pain, while they are the moſt impreſſive, are of rare occurrence ; and that thoſe which are of moſt frequent occurrence, or which it is important for the mind to ſeek for, are attended with pleaſure. It is probable that no ſenſation is at firſt indifferent ; and therefore in the commencement of the growth of intellect, every ſenſation will excite all the attention which is requiſite to give it the degree of efficacy which is neceſſary for the period. All we then have to do, is to allow the attention to remain where the ſenſation calls for it. “ It is unfortunately in the power of a fooliſh nurſe,” ſays Miſs Hamilton, (vol. ii. p. 47.) “ to retard the natural progreſs of the mind, by perpetually interrupting its attention. A child that is much danced about, and much talked to, by a very lively nurſe, has many more ideas than one that is kept by a ſilent and indolent perſon. A nurſe ſhould be able to talk nonſenſe in abundance ; but then ſhe ſhould be able to know when to ſtop.” And the ſame very reſpectable writer adds in a note, from the obſervation of a judicious friend, that nothing more effectually tends to retard the progreſs of the infant faculties than a cuſtom prevalent with nurſes, of keeping the child in a continual trot upon the knees; and this eſpecially in caſes where its attention is moſt cloſely, and therefore moſt uſefully engaged.

But it will not be long before the impreſſions which have often been received ceaſe, by the diminution of their vividneſs, to produce the ſame effect on the mind. When a child has had ſome cultivation of memory and aſſociation, the repetition of a former impreſſion is often much more pleaſant than the firſt reception of a new one; becauſe, if the impreſſion itſelf is leſs lively, and in itſelf conſidered leſs pleaſant, the aſſociated circumſtances often communicate a ſtill more intereſting pleaſure: the child remembers the pleaſure before derived from it; the repetition of it ſets his little faculties to work in connection with his former ſenſation, and the ideas to which it led, and the moderate exerciſe of the faculties is generally pleaſant; and there is often a poſitive pleaſure in the mere repetition of paſt impreſſions, even when the diſpoſition of a child is very active, ariſing from the increaſed power of fully comprehending the objects cauſing the impreſſions. But before the aſſociative power has been much exerciſed, new ſenſations are very commonly more attractive than old ones; and here begins that reſtleſs deſire of novelty, which, while it operates as a moſt powerful ſtimulus to the purſuit of knowledge, requires to be carefully watched in every period of education, leſt the attention ſhould be completely diſſipated, and no knowledge acquired; for there is no principle in education more certain, than that knowledge (clear, correct ideas reſpecting the objects of ſenſe and intellect) cannot be gained by wandering, haſty attention. At this point the efforts of the parent ſhould be given to lead the little mind to the examination and re-examination of the objects of ſenſation; not indeed ſo much by direct influence, as by thoſe little contrivances which a judicious mother ſo ſoon learns by experience, and to aid her in which ſhe may conſult Miſs Edgeworth's excellent obſervations on the ſubject, which, though they more immediately refer to a later period of education, ſuggeſt many important hints reſpecting the beſt methods to be purſued here.

Though we perceive that we ſhall ſwell this diviſion of our article beyond what may be thought its due proportion, yet the ſubject of attention is ſo important, that we ſhall ſelect ſome of Miſs Edgeworth's leading obſervations on the cultivation of the habit, and ſubjoin our own remarks in addition. In doing this we wiſh to lead our readers, if they have not already engaged in it, to the ſtudy of a work, the value of which we rank higher in proportion to our own experience and obſervation, and by no means to prevent it. Though in ſeveral of her poſitions we cannot agree, though we think her work eſſentially deficient, and are by no means ſatisfied as to the probable reſult of her plans on the whole, and though to follow them in detail to any conſiderable extent requires a degree of mental cultivation, and a combination of circumſtances, which are very rare in thoſe walks of life where the ſubject is likely to receive the moſt attention, yet we cannot heſitate in ſtrongly recommending her work, as containing a fund of very important obſervations, the reſult of varied and long-continued experience, guided by ſound judgment and good ſenſe, and generally correct moral views, as exhibiting a number of very important phenomena and principles ſubſervient to mental philoſophy, and as furniſhing to the "practical" parent very valuable aids, even where her plans cannot be minutely followed. Her elementary works ("Early Leſſons," "Parents' Aſſiſtant," &c.) are incomparable; and if their ſtriking and much-to-be-lamented deficiency in every thing like religious principle were ſuitably ſupplied, they would leave ſcarcely a wiſh ungratified. If any female writer ſhould hereafter come forward to the public, poſſeſſing the clearneſs, ſimplicity, correctneſs, and well-ſtored underſtanding of an Edgeworth, the brilliant yet chaſte imagination and "devotional taſte" of a Barbauld, and the energy and high-toned moral principle of a More, diveſted of bigotry, and founded upon genuine Chriſtian theology, in the ſcale of utility ſhe will probably ſtand unrivalled among her contemporaries, however eminent her age may be in every thing great and good. But to return to ſober realities.

The three principles which are laid down by Miſs Edgeworth in her concluding Summary, as of univerſal application, are, that the attention of young people ſhould at firſt be exerciſed for very ſhort periods; that they ſhould never be urged to the point of fatigue; and that pleaſure, eſpecially the pleaſure of ſucceſs, ſhould be aſſociated with the exertions of children. With reſpect to the firſt of theſe points we ſhall extract the following remarks from her chapter on Attention: "Beſides diſtinctneſs and accuracy in the language which we uſe, beſides care to produce but few ideas or terms that are new in our firſt leſſons, we muſt exerciſe attention but during very ſhort periods. In the beginning of every ſcience pupils have much laborious work, we ſhould therefore allow them time; we ſhould repreſs our own impatience when they appear to be ſlow in comprehending reaſons, or in furniſhing analogies. We often expect that thoſe whom we are teaching ſhould know ſome things intuitively, becauſe they may have been ſo long known to us that we forget how we learned them."—"A reaſonable preceptor will not expect from his pupil two efforts of attention at the ſame time; he will not require them at once to learn terms by heart, and to compare the objects which thoſe terms repreſent; he will repeat his terms till they are thoroughly fixed in the memory; he will repeat his reaſoning till the chain of ideas is completely formed. Repetition makes all operations eaſy; even the fatigue of thinking diminiſhes by habit. That we ſhould not increaſe the labour of the mind unſeaſonably, we ſhould watch for the moment when habit has made one leſſon eaſy, and then we may go forwards a new ſtep."

Reſpecting the third point, Miſs Edgeworth urges, that the ſtimuli which we employ to excite attention ſhould be proportioned in degree and duration to the mental character of the individual, and the circumſtances of the caſe. "It is not prudent early to uſe violent or continual ſtimulus, either of a painful or a pleaſurable nature, to excite children to application, becauſe we ſhould, by an intemperate uſe of theſe, weaken the mind, and becauſe we may with a very little patience obtain all we wiſh without theſe expedients." Beſides which, violent motives frequently diſturb and diſſipate the very attention which they attempt to fix. Regularly recurring motives, which intereſt, but do not diſtract the mind, are evidently the beſt. In proportion as the attention becomes habitual, the excitements producing it ſhould be withdrawn. Succeſs is a great pleaſure, and when children have ſometimes taſted it, they will exert their attention merely with the hope of ſucceeding. "Inſtead of increaſing excitements to produce attention, we may vary them, which will have juſt the ſame effect. When ſympathy fails try curioſity; when curioſity fails, try praiſe; when praiſe begins to loſe its effect, try blame; and when you go back again to ſympathy, you will find that after this interval it will have recovered its original power." At the concluſion of her remarks on this head, Miſs E. juſtly urges the cultivation of the affections of children as a moſt important means of acquiring power over their minds, and exciting them to the nobleſt exertions. "When once this generous deſire of affection and eſteem is raiſed in the mind, their exertions ſeem to be univerſal and ſpontaneous: children are then no longer like machines, which require to be wound up regularly to perform certain revolutions; they are animated with a living principle, which directs all that it inſpires."

"With *timid* tempers we ſhould begin with expecting but little from each effort, but whatever is attempted ſhould be certainly within their attainment; ſucceſs will encourage the moſt timid humility. It ſhould be carefully pointed out to diffident children, that attentive patience can do as much as quickneſs of intellect: if they perceive that time makes all the difference between the quick and the ſlow, they will be induced to perſevere."

"It is more difficult to manage with thoſe who have *ſluggiſh*, than with thoſe who have timid attention;" and with reſpect to that claſs of the indolent "who saunter at play and every thing," Miſs Edgeworth does not appear to have diſcovered any remedy. If a child's mind is capable of active exertion in any thing there is hope: the object is to gain the direction of that exertion to the acquiſition of knowledge; but the other caſe ſhe ſeems to conſider as hopeleſs. Locke's propoſal of preſenting them (among other ſtimuli) with fine clothes, eating, &c. ſhe regards as inadequate, but does not ſuggeſt any plan by which the love of knowledge may be produced. We doubt whether inſtances are at all common of ſuch complete want of phyſical ſenſibility as ſhe ſeems to attribute to the ſluggiſh; but "the pain of attention," if it be not excited to ſomething which is beyond the powers of the mind, cannot be ſo great as to render it preferable to undergo ſhame and puniſhment, if judiciouſly adminiſtered. It is probable that a moderate degree of exertion of the faculties is always attended with ſome pleaſure. There are employments which engage the attention, without requiring great effort of mind. The ſimple operations of arithmetic, the copying of paſſages from a printed book, &c. are of this kind. If the performance of ſome of theſe is ſteadily made neceſſary; if temporary abſtinence, for inſtance, or the loſs of every thing which is not neceſſary in diet, be made the regular conſequence of determined ſluggiſhneſs, and the remiſſneſs of attention be conſtantly followed with the trouble of rectifying errors, &c.; in ſhort, if the pain of attention be conſtantly rewarded by the avoidance of ſome greater pain, and the comfort of indolence be conſtantly followed by that greater pain, it cannot be but that in proceſs of time the attention will be leſs irkſome, the mind awakened, and the idea of mental employment accompanied even with ſatisfaction. If once this ſtate is reached, nothing more is wanting, than to make the attention habitual, to employ it gradually on more difficult objects, and as uniformly as poſſible to make remiſſneſs the ſource of inconvenience naturally following from it; and to reward exertion by whatever ſuitable conſequence of it is found to gratify the now awakened mind. The moſt difficult caſe is, where indolence is united with that quiet amiableneſs of diſpoſition, and that tolerable degree of good ſenſe, which, united, make thoſe who do not know how to appreciate the ill effects of the baneful quality, yield their affection and approbation, and give the appearance of injuſtice and harſhneſs to every meaſure of pain or privation which is employed to excite to exertion.

"*Vivacious* children are peculiarly ſuſceptible of blame and praiſe; we have therefore great power over their attachment, if we manage theſe excitements properly. Theſe children ſhould not be praiſed for their happy hits; their firſt glances ſhould not be extolled; on the contrary, they ſhould be rewarded with univerſal approbation when they give proofs of patient induſtry, when they bring any thing to perfection."—"To win the attention of vivacious children, we muſt ſometimes follow them in their zig-zag courſe, and even preſs them to the end of their train of thought. They will be content when they have obtained a full hearing; then they will have leiſure to diſcover that what they were in ſuch haſte to utter was not ſo well worth ſaying as they imagined; that their bright ideas often, when ſteadily examined, fade into abſurdities." With reſpect to children of this character, we think Miſs Edgeworth's remarks peculiarly happy; and from many which we might with advantage ſelect, we will tranſcribe the following: "We ſhould not humour the attention of young people, by teaching them always in the mode which we know ſuits their temper beſt. Vivacious pupils ſhould from time to time be accuſtomed to an exact enumeration of particulars; and we ſhould take opportunities to convince them, that an orderly connection of proofs, and a minute obſervance of apparent trifles, are requiſite to produce the lively deſcriptions, great diſcoveries, and happy inventions, which pupils of this diſpoſition are ever prone to admire with enthuſiaſm. They will learn not to paſs over *old* things, when they perceive that theſe may lead to ſomething *new*; and they will even ſubmit to ſober attention, when they feel that this is neceſſary to the rapidity of genius."

Judicious and uſeful as theſe obſervations are, we are of opinion that Miſs Edgeworth has, in her ſyſtem of education, too much left out of view the actual condition of human nature, that, in every department of life, circumſtances are continually occurring in which it is neceſſary that the attention ſhould be given to objects not in themſelves pleaſant, from their ſubſerviency to others which are of importance, and that exertions, in like manner, muſt often be made, to which nothing but a ſenſe of duty would prompt. With reſpect to the obſervations which we have extracted, they have all their value, and may be applied, with modifications, not only to the earlieſt periods of education, but to every ſucceeding ſtage; yet her plans ſtrike us as deficient. They are principally calculated for thoſe caſes in which, from early example and cultivation, there is a deſire of knowledge excited, in which it is imbibed without direct effort on the part of the parent or early inſtructor, in which, from the habits and purſuits of thoſe around, its advantages are at once felt, and the acquiſition of it regarded as of the firſt importance. In the hands of ſuch teachers as Miſs Edgeworth, ſo well ſuited to the taſk by enlightened judgment, ſteady perſeverance, and the ready command of much varied knowledge, with children whoſe early habits they have themſelves formed, whoſe underſtandings they have cultivated and furniſhed with ideas, the proceſſes which ſhe has pointed out may be all which are ſufficient: but we doubt whether the ends propoſed can, in general, be anſwered by ſuch means alone; and ſtill more, whether they are, in general, calculated to produce that ſtrength and energy of mind which, with a view to an object fixed upon as important, can ſteadily purſue a courſe of arduous exertion.

The habit of attention muſt be gained in order to make any progreſs in intellectual culture; that is of courſe a point decided. It cannot be acquired too early, becauſe thus the utmoſt efficacy will be given to all the other operations of the mind, and eſpecially to the acquiſition of clear, impreſſive, and ſerviceable perceptions; that is alſo a point indiſputable. It muſt, too, be aſſociated with volition as early as poſſible, and then the foundation is laid for every degree of mental culture to which circumſtances may direct.

We are of opinion, that, after this point, Miſs Edgeworth's plans are defective. Her pupils are to be *allured* on too much. The path of knowledge is often a difficult one, and ſometimes requires painful efforts; ſo alſo the path of duty; and the culture to which her ſyſtem is chiefly confined, is ſcarcely calculated to produce that hardy vigour of mind, which, whether the poſſeſſor is called to engage in the higheſt purſuits of ſcience, or in the narrower ſphere of ſocial employment and duties, cannot be otherwiſe than valuable. When the power of voluntary attention is acquired, then the various motives of confidence in the judgment of the teacher, of habitual ſubmiſſion to authority, of affection, and perhaps occaſionally of fear, ſhould be employed as circumſtances direct, in order to give it ſtrength and activity, to excite the pupil to ſuch employment of it as may make it a hardy vigorous principle, capable of employment, even where the employment may have no intrinſic attraction, and may even be at firſt poſitively painful.

If a purſuit can be made attractive to a pupil at the outſet, it is well; but if he have acquired that hardineſs of attention of which we ſpeak, which will enable him to ſtruggle through firſt difficulties, and perhaps by degrees to take ſome delight in them, he is then fitted for the acquiſition of any branch of knowledge to which his objects in life, or the bent of his own inclination and cultivation of his underſtanding, may induce his inſtructor to direct him. If he have not acquired that ſtrength or activity of attention, difficulties which muſt meet him in the higher departments of literature and ſcience, will often be found to ſtop him; and however judiciouſly his attention may have been early cultivated, if it have not acquired this firmneſs, the attractions of leſs arduous purſuits, which will ſtill gratify his taſte for knowledge, will effectually check all progreſs.

There are few points in which the cultivation of the intellectual powers is concerned, in which we do not find the importance of the moral habits, particularly of diffidence, of ſubmiſſion, and the deſire of doing what is right; where theſe are ſuitably produced in the mind by previous education, the culture of the attention very greatly depends upon the inſtructor. The attention may be reſtleſs, or it may be ſluggiſh; but the more ſuitable efforts are made to render it voluntary, the more it comes under the command. Theſe efforts will be made, if the diſpoſitions are right; and when the attention is once become to a conſiderable degree voluntary, the direction of it may be obtained (by the influence of thoſe views and motives, which the above-mentioned moral habits put in the power of the inſtructor,) to whatever object it is thought right to direct it. Thus influenced and directed the way will be comparatively clear. Where the attention is fairly given, the mere employment of the mind becomes itſelf pleaſant. Difficulties will then be overcome, and the pleaſure of ſucceſs will aid every other motive. By degrees the utility of the object begins to be diſtinctly ſeen, and the purpoſes of the different ſteps which are taken to gain it are alſo diſcerned, and then if the habit of patient induſtry have been formed, or the continued direction of the attention be kept up by the influence of the moral habits, the judgment will aid and encourage every exertion, and at the ſame time the foundation of a moſt valuable habit will be laid, of purſuing definite important ends, by the ſteady uſe of ſuitable means.

The habit of attention, or at leaſt the direction of the attention to any object, muſt ſometimes be produced by compulſion, wholly or in part. What kind of compulſion ſhould be employed, and eſpecially whether or not corporeal pain is in any inſtance expedient for this purpoſe, and in other departments of education, will be conſidered under the head of MORAL *Education*: but we here have only to ſtate the fact, that unleſs every impreſſion could be regulated by a judicious parent, from the very birth, compulſion muſt ſometimes be employed, even in the beſt ſymptoms of education,—that education in which compulſion has not been employed, might probably produce amiable characters, but ſeldom ſuch as will be great in intellectual or moral worth,—that as early education has long been, and it is to be feared long will be, too generally conducted without any ſteady cultivation of the habits of induſtry and attention, and of ready ſubmiſſion to authority, the inſtructor to whom children are committed, whether at home or at ſchool, will commonly find ſome degree of compulſion neceſſary, in order to produce that degree of attention which is requiſite for any valuable improvement. With reſpect to this period, and theſe caſes of much neglected mental and moral culture, the chief points appear to be, to proportion the exertion required, as much as poſſible to the degree, not of actual capacity, but of habits poſſeſſed; to abſtract as much as poſſible all cauſes of inattention, and to generate the impreſſion that the effort muſt be made. By whatever means the habit of attention is produced and rendered voluntary, and the more frequently and regularly it is produced by volition, the more it becomes at the command of the will, the eaſier, and conſequently the more pleaſant it becomes, and the more therefore it can be excited when the motives are ſufficiently ſtrong to produce it. It is not, then, "the attention of circumſtances," but the attention of volition: and will then be ſubject in a great meaſure to the judgment, guided by a ſenſe of the importance of the object either in itſelf or to the individual, or to thoſe ſtrong motives which ariſe from the pleaſures of activity, from the gratification of curioſity, the influence of prevailing faſhions, the deſire of obtaining the approbation of thoſe we love, &c.

When the early training of the mind has made its perceptions diſtinct and efficacious, and has given it the habit of ſteady attention, the grand points in intellectual culture are ſecured; and the reſt will proceed, with tolerable care, in the direction which ſound views may dictate.

V. When the attention is directed to ſome particular object of thought, ſo as to prevent its being diverted to any other object of thought, or to any external impreſſion, it is denominated *Abſtraction*. This ſtate of mind has been ſeldom dignified with the name of abſtraction, except when directed to objects out of the common ſphere of thought; but Miſs Edgworth has ſhewn, by her uſual happy method of illuſtration, that it is the ſame habit or exerciſe of mind, whether it be devoted to the higheſt flights of philoſophic purſuit, or to the uſual concerns of life. "Perſons of ordinary abilities," ſhe juſtly remarks, "tradeſmen and ſhopkeepers, in the midſt of the tumult of a public city, in the noiſe of rumbling carts and rattling carriages, amidſt the voice of a multitude of people talking upon various ſubjects, amidſt the provoking interruptions of continual queſtions and anſwers, and in the broad glare of a hot ſun, can command and abſtract their attention, ſo far as to calculate yards, ells, and nails, to caſt up long ſums in addition right to a farthing, and to make multifarious bills with quick and unerring preciſion."

The habit of abſtraction is dependent upon various cauſes; but every perſon to whom the attainment of it is neceſſary, finds it ſuſceptible of culture. It much depends upon the familiarity of the impreſſions which are otherwiſe moſt likely to affect the mind: novel impreſſions from external objects, by their novelty attract the notice of the mind and tend to diſtract the attention: ſenſations which have been long and cloſely connected with trains of thought or feeling, are calculated to divert the attention: objects to which we have been accuſtomed to attend, in like manner ſolicit the notice of the mind from thoſe to which we may otherwiſe wiſh to attend. In ſituations, therefore, where we receive novel ſenſations, unleſs there is a proportionate devotement of the mind to the object of its attention, theſe will at firſt diſtract the attention; and ſo on in the other caſes. Abſtraction depends, too, in part, upon the phyſical ſtate of the ſyſtem. If the nervous ſyſtem is in a ſtrong degree of excitements, external impreſſions proportionally affect the mind, and, of courſe, tend the more to diſtract the attention. Abſtraction is likewiſe ſeriouſly impaired by a general tendency to dwell upon the directly ſelfiſh feelings, whether pleaſurable or painful; becauſe as theſe are conſtantly preſent to the mind, and conſtitute the moſt powerful agents, in their immediate effects, upon the mental ſyſtem, the habitual tendency to give attention to them, puts an almoſt total ſtop to any valuable degree of abſtraction in favour of thoſe objects, which are not immediately connected with ſelf; and this, by the way, furniſhes us with another inſtance of the influence of moral upon intellectual education. This habit alſo depends for its vigour, upon the degree in which the intereſt of the mind can be excited towards an object. With minds of ardour and activity, if the mind be engaged, it is abſtracted from every impreſſion and thought, not immediately connected with the object: and if the intereſt of the mind is ſtrongly excited from any other cauſe, the ſame effect will happen. The vigour of abſtraction alſo, depends, in part, upon the degree in which the habit of obſervation is poſſeſſed; indeed they are ſo much in oppoſition to each other, that to any conſiderable degree they are ſeldom found united in the ſame individual. The habit of obſervation implies habitual attention to the objects of ſenſe; the habit of abſtraction to the objects of intellect. The habit of abſtraction is not therefore to be expected, and indeed ought not to be directly cultivated in the earlieſt periods of intellectual education. Nevertheleſs, both qualities depending upon the general habit of cloſe attention, the cultivation of the obſervation is indirectly laying a good foundation for the ſubſequent cultivation of the abſtraction.

As two objects cannot engroſs the attention of the mind at the ſame time, abſtraction may be cultivated by rendering the mind habitually inattentive to thoſe objects which are not to occupy it, or by making it habitually attentive to thoſe which are from any cauſe the objects of preference. The former plan ſhould be adopted, if at all, with great caution. It may generally be left to the efficacy of habit in leſſening the efficacy of impreſſions; and the habitual neglect of any commonly occurring objects of obſervation or reflection, is inconſiſtent with the purſuits of life. The ſecond plan is in every point of view preferable; and every inſtance in which the attention is fixed, whether through direct volition, or by means of excitement without the exerciſe of volition, is eſſentially contributing to the cultivation of abſtraction; ſtill more ſo, every inſtance in which the attention is engaged upon the objects of thought, in ſituations in which there are frequent impreſſions from external objects which, if the attention were not ſo engaged, would then excite the obſervation. Hence it is deſirable to accuſtom the young to mental exertion where there are cauſes tending to diſtract their attention, provided however that from their novelty or their power they are not calculated to force it. Whatever tends to make the objects of the mind intereſting, and to give ardour in the purſuit of them, alſo tends to cultivate the habit of abſtraction; for that which deeply intereſts the mind, fixes the attention, and of courſe prevents every other object from ſharing the notice of the mind.

The power of directing the mind to objects which afford no impreſſion upon the ſenſes, and even in oppoſition to ſuch as do, is of extreme importance in the later periods of mental culture, and at the ſame time, with the aſſiſtance of previous culture, is much eaſier than would, with any cultivation, be poſſible at an early period. In childhood and youth ſenſations more affect the mind, than the ſenſations themſelves can do as we advance farther in life; and though aſſociated thoughts and feelings aſſiſt to keep up the influence of the ſenſations themſelves, yet if the mind have been accuſtomed early to think of what are not the direct objects of ſenſation, the power of its own thoughts and feelings eaſily overbalances the effect of at leaſt cuſtomary ſenſations. Carried to an undue extent, the habit of abſtraction is unſuitable to our ſituation as ſocial beings; but there is ſcarcely any plan of life in which it is not in ſome meaſure requiſite; and in the purſuits of ſcience, whether phyſical or mental, it is continually required, and continually ſtrengthened by exerciſe. It is even very important in the events of life. The power of directing the attention to ſome ſpecific objects of thought, to the excluſion of others, and to the excluſion of external impreſſions, conſtitutes (as Miſs Edgeworth well obſerves) the leading feature of that quality which we call preſence of mind, and which is ſo often of ſignal ſervice to our welfare, and even to the preſervation of our lives. And this habit is eſſentially requiſite in our moral and religious culture; the acquiſition of religious knowledge conſtantly implies the employment of abſtraction; in the exerciſe of religious affections it is abſolutely neceſſary; and in the diſcharge of duty, in oppoſition to powerful temptations, the power of fixing the attention upon thoſe views and principles which ought to guide us, is of the utmoſt importance.

The habit of abſtraction is in general to be cultivated rather indirectly than directly, in the earlier periods of education; and it is one advantage of the purſuit of knowledge, that it frequently requires fixed attention upon the objects of thought, without aid from the ſenſations. Perhaps it would be beneficial to extend the occaſions for this, in literary and ſcientific education. An eaſy demonſtration carried on without a figure, an operation in arithmetic ſuited to the progreſs of the pupil performed without the aid of the pen or pencil, the deſcription of ſome former object of obſervation, the conſtruing or parſing of ſentences from the claſſics without book, and ſimilar exerciſes of mind, are all calculated to cultivate this habit; and wherever the point can be gained, it greatly increaſes the power of the mind over its attention. Theſe mental operations may uſually be begun early; a child of three or four years of age, can eaſily be brought to make a little addition *in his head;* and while he does ſo, his mind muſt neceſſarily be occupied to the excluſion of other thoughts and of ſenſations. If he thinks cloſely of what he has ſeen, for the time he is exerciſing his abſtraction. If he is led to think on ſome of the ſimple truths of religion, he is exerciſing his abſtraction; indeed theſe conſtitute ſome of the earlieſt and moſt powerful exerciſes of abſtraction. It is very important that theſe and ſimilar mental operations ſhould not be made too frequent, nor continued too long. They ſhould not be continued too long, leſt the fatigue of mind experienced ſhould leſſen the wiſh to think, and in reality check the power over the attention; they ſhould not be made too frequent, becauſe, as we have already obſerved, childhood is the period of obſervation rather than of abſtraction. If the young mind is too much accuſtomed to think about its own thoughts, the imagination will gain too much power, and that habit of inattention to external impreſſions will be formed, which, in moſt caſes, is always injurious, and which in the early period of life is ſufficient to ſtop its progreſs in intellectual improvement. In this, however, as in every branch of education, our efforts ſhould often be regulated by the prevailing mental habits of the individual. A child of lively conceptions ſhould be directed as much as practicable to accurate obſervation; where the conceptions are dull, abſtraction ſhould be encouraged; and it is encouraged by every inſtance in which it is exerciſed with pleaſure, by every inſtance in ſhort, in which the mind is pleaſantly engaged upon the objects of thought without the aſſiſtance of ſenſation, and eſpecially if in oppoſition to ſenſations. Theſe the intelligent parent has greatly at her command; an account of a walk requiring the recollection of little circumſtances and objects which occurred during it, the retracing of ideas on any intereſting ſubject, and various other exerciſes of a ſimilar kind, contribute to cultivate the abſtraction. But after all, it is rather by indirect means, than directly, that we are in the early periods of intellectual culture, to aim to produce and exerciſe this habit. By early giving a decided bias for intellectual purſuits, and exciting a lively intereſt in them, and by forming the habit of ſteady attention to the objects of knowledge as they are preſented to the mind, we do in reality prepare it for the cultivation of the habit of abſtraction, whenever it may be called for by the higher purſuits of knowledge.

Abſence of mind ſometimes ariſes from the mind's being fully occupied with its own trains of thought, but it ſhould not be confounded with abſtraction. The latter implies, at leaſt in the commencement of the particular exerciſe of it, a voluntary direction of the mind: the former, even where it is really cauſed by mental operations, commonly ſuppoſes a want of power over the attention; but it very often ariſes from a more ſluggiſh inattention to external impreſſions. Abſence of mind, proceeding from this laſt cauſe, ſhould be ſteadily and conſtantly checked; not ſo much, however, directly, as by rouſing the attention to the objects of ſenſation, by making the neglect of them unpleaſant, &c.: and it ſhould by every means be diſcouraged in the early periods of education, becauſe it will by degrees induce a tendency to reverie which muſt almoſt inevitably give the imagination undue power, and which is more than any quality of mind calculated to deſtroy all the valuable effects of the habit of well regulated abſtraction. In the external appearances, abſence of mind proceeding from reverie, differs little, if at all, from the fixed intentional devotement of the mind to ſome object of thought; but thoſe who have experienced both, and who have watched their characteriſtics in the young, know that the difference is very important, and deſerving of the careful attention of the early inſtructor. In fact, the habit of reverie is the moſt baneful poſſible to the influence of the mind over its trains of thought; and totally deſtroys, if too much indulged, all power of ſteadily directing the attention to ſpecific objects of mental purſuit.

VI. We have hitherto ſpoken of the *habit* of abſtraction, by which we underſtand (agreeably, we believe, to the common acceptation of the term) the devotement of the attention to ſome objects of thought, to the excluſion of others, and alſo of impreſſions from external objects; but it is well known, that the word is alſo uſed by ſome writers on logic and mental philoſophy, to denote the *power* which the underſtanding has (or rather, is ſuppoſed to have) of ſeparating the combinations which are preſented by it. We introduce the qualifying clauſe, 'is ſuppoſed to have,' becauſe in many caſes the underſtanding has no ſuch power; it is impoſſible, for inſtance, to form a conception of extenſion, without ſome idea of colour, or of length without breadth; but in reality, the *abſtractive power* is, after all, nothing more or leſs, than the power of ſeparate attention, the power of attending to one idea diſtinct from the combination in which it occurs,—of attending to one part of a conception diſtinct from the reſt, and perhaps, by degrees, forming a conception of that part detached from the reſt, of attending to one quality or circumſtance ſeparate from other qualities or circumſtances with which it is really connected, or connected in the mind.

The habit of abſtraction, or fixed attention to the objects of thought, is eſſential to any high degree of mental progreſs, and is requiſite in various circumſtances in life; the power of abſtraction, or of ſeparate attention to ſome object of the mind diſtinct from the combinations in which it is preſented, is neceſſary in almoſt every proceſs of reaſoning, and is the foundation of an accurate, diſcriminating judgment. The power of abſtraction, in this ſenſe, may obviouſly be cultivated without the exerciſe of the habit of abſtraction; except indeed where the object is purely mental. A child attending to one part of a proſpect, to one part of a flower, to one of the ſenſations which an object preſents, (to the colour of a ſubſtance, for inſtance, inſtead of its ſmell or ſhape, or ſize or weight, or to any one of theſe without attending to the colours,) is exerciſing the power of abſtraction; and in theſe very uſeful exerciſes of the power of abſtraction, the habit of abſtraction is not called for; all that is wanting is that of obſervation. On the other hand, the habit of abſtraction may have been cultivated even to exceſs, without the individual poſſeſſing the power of attending to one of a combination of objects, or to a part of a conception, ſo as not to allow the reſt to influence his reaſonings and judgment.

The involuntary exerciſe of the power of abſtraction, is very often produced by the mere influence of the aſſociative power, without any effort on the part of the individual, and ſometimes by the influence of the ſenſations themſelves. Inſtances of the latter continually occur. That impreſſion from any object which is the moſt vivid, attracts the notice of a child; and while the attention is directed to this, the other impreſſions from it remain unnoticed. But the exerciſe of the abſtractive power is often, in a great meaſure, voluntary; and though that degree of this power which ſhall completely ſeparate at once the combinations which are preſented to it, is probably altogether chimerical, yet it is in our power to acquire it to ſuch a degree that the parts which we wiſh to exclude from the attention ſhall not affect our reaſonings, and but little even our feelings. We do not mean that in all caſes we have ſuch power; but the more the mind is trained to it, the more it is to be acquired. And here again we perceive the advantage of the purſuits of literature and ſtill more of ſcience. The abſtractive power is continually brought into exerciſe in moſt of the leading objects of mental occupation. The young are thereby continually led to leave out of view ſome circumſtance or quality, and to direct their attention to the eſſential points. Every definition that is underſtood and made the foundation of reaſoning, every exerciſe of claſſification of words or natural objects according to ſome ſyſtem, brings into play this important faculty. It is neceſſary to every correct judgment, and at the ſame time the cultivation of the judgment ſerves as its guide and brings it into exerciſe.

The abſtractive power ſhould be early exerciſed, but moſt commonly upon the objects of ſenſation. Still however not without caution; becauſe, though ſeparate, ſelect attention is of great conſequence in the later periods of education, yet in the earlier periods, the firſt point is correct and extenſive obſervation in order to lay up a fund of ideas for the future operations of the underſtanding.

With reſpect to the operations of the abſtractive power, as neceſſary in the proceſſes of the imagination, they may be very much left to themſelves. We have no wiſh that the imagination ſhould be ſacrificed; for it is of great importance in the conduct of life, in the purſuits of ſcience, and in ſpiritualizing the mind; but where there is that caſt of mind which will lead to form new combinations from its conceptions; all that is neceſſary is, to give the obſervation frequent opportunities of exerciſe, in various ſituations, upon the objects of ſenſation, that they may be ſeen under different aſpects, and in different combinations. It is in our own power, at any time, to ſee only parts of an object; and by dwelling upon theſe parts, we can form conceptions of them detached from others with which they are connected. Hence, the viſual conceptions are very eaſily ſubjected to the abſtractive power; and as to the objects of hearing and ſmell, they have ſo little neceſſary connection with the objects of ſight, the ſenſations can be received, and the conceptions reproduced, ſo completely independent of viſual impreſſions or conceptions, that there is ſtill leſs difficulty in exerciſing the abſtractive power upon them. Where, therefore, the imagination has any conſiderable ſtrength and activity, the abſtractive power may be expected to be ſufficiently at its command without direct cultivation. Where, however, the imagination is weak or ſluggiſh, it may be adviſable, by leading the attention to ſeparate ſenſations, and to parts of objects diſtinct from the whole, and by directing the obſervation to the ſame objects under different points of view, to cultivate the abſtractive power with ſpecific reference to the conceptions as materials of the imagination. And this ſhould occaſionally be done with a ſtill higher aim, to accuſtom the mind to ſeparate the combinations preſented to it, in order that thoſe haſty, caſual, and erroneous aſſociations may be weakened, which ſo often completely miſlead the judgment, and which, where they do not directly and obviouſly affect it, imperceptibly warp it, and materially increaſe the difficulties which obſtruct the reception of truth.

VII. By the *Memory* we underſtand that power which retains ideas, and which can bring them back again to the view of the mind. The latter act is generally known by the name of recollection; the former, as Mr. Stewart has obſerved, has not yet received any appropriate appellation. It might be called retention; but it appears decidedly preferable to appropriate this appellation to that capacity, or power of the mind, by which relicts of ſenſations are retained, by which, in fact, ſenſations produce ideas.

It is totally unneceſſary that we ſhould dwell upon the importance of this power of the mind. Were it not for the capacity of retaining ideas from ſenſations, man would be a being of mere ſenſation. But without going to this extent, if the retaining power of the memory were greatly impaired, paſt impreſſions, paſt reaſonings, paſt concluſions, paſt experience, would be of no ſervice to the mind in the conduct of life, or in the purſuits of ſcience; and without the power of recalling them to the view of the mind when required by circumſtances, they would in a great meaſure loſe their efficacy and advantage. To make the memory, however, duly ſubſervient to the uſual objects of life, and to the acquiſition of knowledge, it muſt be placed under the regulation of the judgment; and an accurately retentive memory, united with facility of recollection, accompanied with, and guided by, a ſound judgment, may be conſidered as the ſummit of excellence in this branch of the mental faculties.

To enter into the proper diſcipline of the memory, when the individual is ſo far advanced in the cultivation of the underſtanding, as to be able to regulate the culture of his own mind, is not our province: and if it were, we ſhould be able to add little to thoſe very excellent and important remarks which our readers will find in Dugald Stewart's elegant and ſcientific ſection on the culture of the memory. The queſtion which we have to conſider is, what cultivation of the memory is moſt ſuited to thoſe periods which are uſually devoted to education.

We cultivate the memory indirectly by every inſtance in which the attention is directed to the objects of ſenſation; for the vigour and correctneſs of the memory, ſo far as it reſpects external objects, muſt greatly depend upon the accuracy of the perception. In ſome points of view it may be conſidered as the only object at which we need aim with reſpect to the memory in the earlieſt periods of education; for where the ſenſations are duly made the objects of attention, the ſtructure of every mind probably is ſuch, that ideas will be received from them; and the firſt point is, to gain ideas, which may become the rudiments of perceptions, conceptions, notions, and feelings.

The mere formation of ideas from ſenſation, is, however, ſeldom referred to the memory; and though this is a moſt important object, and ſerves as the baſis for every future operation of the mind, it is ſo cloſely connected with the act of ſenſation, that it can ſcarcely be diſtinguiſhed from it. In all probability every impreſſion and every thought which has the notice of the mind, have ſome effect in modifying or ſtrengthening the correſponding ideas which were previouſly formed, if they do not form new ideas; and often without our obſerving the proceſs: but we do not uſually ſpeak of ſuch retention as an act of memory, confining the operation of this power to caſes in which we can bring again into the view of the mind the objects of obſervation and reflection. If the ideas produced by obſervation or reflection have been ſo much impreſſed upon the mind, that by active or paſſive recollection they can be brought again into its view as they were at firſt produced, the retention and recollection of them are conſidered as operations of the memory.

As the mere retention of ideas without the power of recalling them, would be of little conſequence, and as the recollection of ideas ſerves greatly to ſtrengthen the retention of them, it appears that one leading object of our aim in the early culture of the memory, ſhould be, to produce the habit of ready, diſtinct, and accurate recollection. This muſt of courſe, in the commencement of intellectual culture, be employed merely upon the objects of ſenſation, of which the firſt will be words. When a comparatively ſmall number of words have been acquired, the recollection ſhould occaſionally be exerciſed reſpecting paſt ſenſations; chiefly thoſe of ſight, which are in the firſt inſtance moſt eaſily retained and recalled. By degrees, thoſe which have been received by the ſenſe of hearing, ſhould alſo be made the ſubject of recollection; partly with a view to ſtrengthen the power of recollection, but ſtill more the habit of obſervation, and of attention to thoſe directions which in the early periods of childhood are ſo eſſential to well-being, and ſometimes even to exiſtence. For ſeveral years from birth, it appears to us ſcarcely deſirable to exerciſe the memory much upon a connected ſeries of words; the power of recollecting words is of great importance in a later period of the mental progreſs, but in the earlier, the firſt object is ideas; and young children ſhould ſeldom (if ever) be required to repeat words without having a clear idea of the meaning of them. Such ideas muſt neceſſarily be deficient; but they ſhould be correct as far as they go, and at any rate ſhould be ſuch as the little mind can graſp. If the habit of remembering words, and of recollecting them, without underſtanding them, is once begun, there is afterwards a very great difficulty in cultivating the underſtanding, and in making the memory, what it ought always to be, however important in itſelf, a ſubſervient faculty.

In the early exerciſes of the recollection, we are to be fully ſatisfied with correctneſs, however deficient it may be in fulneſs. Correctneſs (we of courſe do not mean in the repetition of words, but in the recollection of ideas) ſhould always be aimed at. The imagination will not loſe by this; for the correct recollection of conceptions and notions tends to fix them more upon the mind; and theſe are the materials upon which the imagination is to be employed. Moſt certainly the underſtanding will be a gainer; for the object of the underſtanding is truth; and truth cannot be found by that mind which has been trained up to falſehood by early habit of inaccuracy. We have no objection for the little imagination early to work upon the conceptions which have already been treaſured up in the mind, under thoſe limits which continual attention will neceſſarily ſet upon the operations of the imagination; only let a child be habituated, in detailing its inventions, to detail them as ſuch; and when recollecting the paſt objects of obſervation, to give a faithful outline of them, however imperfect it may neceſſarily be. We have known an inſtance in which a child not above four or five years of age, whoſe imagination was lively, and whoſe recollection (and perhaps obſervation alſo) had unhappily not been trained to accuracy, frequently told his friends circumſtances which had no exiſtence except in his own mind, with the regularity, and much of the conſiſtency of real facts, and, probably, by degrees did not know whether he was ſpeaking of the creations of his fancy, or of things which he had actually ſeen and heard. Such caſes muſt excite our regret for the paſt, and our apprehenſion for the future.

Great difficulty often exiſts, eſpecially in the minds of perſons whoſe conceptions are vigorous, and who have not been habitually careful to cultivate accuracy of perception and correctneſs in the relation of recollections, to know whether the trains of ideas preſented by the aſſociative power are to be referred to the memory or to the imagination. Such perſons, ſeizing only the outline of a fact or ſeries of occurrences, owing to habitual inattention to their ſenſations, are, from readineſs of aſſociation, able to fill up the tranſcript, ſo as to make it appear plauſible to themſelves; and by once or twice detailing it without minute regard to accuracy, except in thoſe leading features, they give a degree of vigour to the ideas, and of cloſeneſs to the aſſociation of them, which at laſt leads to the full conviction that the whole is recollected. Caſes of this ſort are very frequent; and they often leave upon the minds of others, the belief that ſuch perſons intentionally depart from truth; whereas the fact ſometimes is, that part of their error ariſes from a deſire to give the whole truth when they have materials for only a portion of it in their minds. However, the fault is one which ſhould be carefully guarded againſt, particularly in the early part of life, by making young perſons of lively imagination habitually attentive to the minute as well as to the leading parts of their impreſſions.

Recollection ſhould often be exerciſed directly; but the main object, after all, is, to acquire the power of bringing forwards our ideas when they are wanting; and it ſhould therefore be often exerciſed indirectly, by leading to it for thoſe various purpoſes of life, in which the young are ſometimes capable of being uſeful, and ſtill more, by encouraging the ſtatement of paſt ideas as they are called up by preſent objects, eſpecially when the connection is natural and of a kind likely to be ſerviceable. This ſpecies of recollection obviouſly depends upon the manner in which the aſſociative power is exerciſed; and in fact it is itſelf an exerciſe of that power, to which the young ſhould be led in every practicable way; in the period of childhood by free communication with their friends on their various purſuits and occupations, and afterwards, in addition to theſe means, by compoſition. Continual opportunities occur in almoſt every department of inſtruction, for the advantageous recollection of related ideas which have been before received; and it is only by their being brought into employment, and aſſociated with other ideas and trains of thought, that they can be expected to be permanently retained in the mind, or, if retained, to be at its command.

The recollection of ideas is greatly aided by the connection of words both with them, and with the original impreſſions; for words being, from the conſtant uſe of language, familiar to perſons of moderate mental culture, even in various combinations, they are eaſily retained, and moſt materially aſſiſt in producing the recurrence of the correſponding ideas. And thus, when a perſon is relating a paſt fact, the ideas in ſome caſes ſuggeſt the words, and in others the words ſuggeſt the ideas. Hence illiterate perſons, other things being equal, do not remember nearly ſo well as others. Hence alſo the importance of teaching the young to remember words as well as things; for in moſt caſes, as words ſerve as the bond of ideas, ideas will be looſe and floating in the mind unleſs connected with words.

After what we have ſaid reſpecting the memory, we ſhall not be miſunderſtood when we ſay, that the cultivation of it ſhould conſtitute a very eſſential object in the early periods of intellectual education. Without a doubt there are original diverſities in the capabilities of the mind; and it ſhould be one grand object in mental culture, to excite thoſe which are weak, and to curb and regulate thoſe which are exceſſive. With reſpect to the memory, ſome young perſons appear to retain words, and even ideas, with a degree of facility which aſtoniſhes and perhaps delights the partial friend, while at the ſame time it furniſhes ſome ground for alarm, leſt that which ought always to be made ſubſervient ſhould have the aſcendancy, and prevent due attention to the cultivation of the judgment and reaſoning powers. Others are ſlow in acquiring, but retain for a long time. Others again are diſtinguiſhed by the readineſs with which they recollect, and the eaſe and aptitude with which they bring forwards what their memory has ſtored up; and if the memory has been judiciouſly employed, and the principles of aſſociation have been ſuch as are advantageous to the judgment, this is all which can be wiſhed for. With reſpect to thoſe who poſſeſs great facility of retention, it ſhould be the aim of the inſtructor to encourage, as much as poſſible, the ſound exerciſe of the judgment, and the long retention and ſuitable recollection of ideas, rather than the eaſy acquiſition of words, even if properly underſtood. Durability of retention depends in a great meaſure upon the manner in which ideas are aſſociated in the mind, and upon the caſt of the ideas which have already been received and retained; but this facility of retention, though depending in part upon exerciſe, ſeems to ariſe in no ſmall degree from corporeal organization. It is valuable only as made the foundation of a good memory: it often leads to neglect thoſe exerciſes of the underſtanding, to which it ſhould only be auxiliary, becauſe they are more difficult; and the conſequence, in innumerable inſtances, has been, that while apparently the mental progreſs is going on very rapidly, the judgment, and the reaſoning powers, are almoſt dormant, and the whole of the mental ſtore of the individual conſiſts in the words, or at moſt the ideas of others, without any real acquiſitions of thought, and even without that new-modelling and arranging of them, which would give a degree of appropriation to the poſſeſſion. We have known an individual arrived almoſt at the age of manhood, who found it ſo much eaſier to learn Euclid's Elements by rote, than to underſtand them, that he actually went through ſeveral of the early propoſitions without any ſuſpicion being excited that he had not fully maſtered them; till on an accidental change in the lettering of the figure, or in the conſtruction itſelf, it was diſcovered that memory, not underſtanding, had been exerciſed throughout. Where, however, facility in retention is not poſſeſſed, though it is by no means the moſt important feature of the memory, yet it ſhould be cultivated, directly by actual exerciſe, but ſtill more by well ſtoring the mind with thoſe really valuable ideas which will ſerve as connecting bonds for new ones. That kind or degree of retention which ariſes from aſſociation, not from original organization, is of the greateſt value; and this may be improved to almoſt any valuable extent, where there is good ſenſe to work upon.

Where the purſuits are directed to the acquiſition of literature and ſcience, there is no danger of a want of objects on which to exerciſe the memory in all its uſual qualities. Indeed the danger principally is, of doing too much; and ſtill more, of cultivating the memory almoſt excluſively. The apprehenſion of this has led many ingenious perſons who have been concerned in education, to do too little. They conſider it is unneceſſary to exerciſe the memory more than they think will be probably uſeful in life, or to burden it with things which, if they ſhould be uſeful, may be eaſily acquired when they are wanting. They ſee the memory often made almoſt the only object of education, facts ſtored up without any judicious link of connection, and words, in themſelves conſidered almoſt unintelligible, and which at any rate convey no ideas to the mind of the learner, committed to memory without explanation; and they go into the oppoſite extreme, and ſuppoſe that the cultivation of the judgment is all which they need attend to. Truth, as in many other inſtances, lies between the extremes. The cultivation of the memory ought, moſt aſſuredly, never to ſuperſede that of the judgment; but, on the contrary, ſhould be kept in ſubordination to it, and be regulated by it: but when it is conſidered how many of the purpoſes of life require accuracy and facility of recollection, how neceſſary the memory is to the purſuits of ſcience and literature, and even to the cultivation and exerciſe of the moral ſenſe, can we doubt that as a ſubſervient faculty, and, with a view to its ſubſerviency, we can ſcarcely cultivate it too much.

Without a doubt, the recollection of ideas is the object of the greateſt conſequence; but as we have already ſtated, the memory ſhould often be exerciſed on *words*, both as an aid to the remembrance of *ideas*, and on account of the great importance of an accurate recollection of words in the uſual, as well as in the more peculiar concerns of life. We ſhall never forget, that, in all probability, the reputed murderers of Steele loſt their lives by the definite article being introduced, we doubt not unintentionally, by the reporter of their words: if they ſaid, "We muſt have had gin there," (not as we believe was ſtated in evidence, "We muſt have had the gin there,") their words, ſo far from being a ſtrong, indeed preponderating argument againſt them, were plainly conſiſtent, and indeed moſt conſiſtent, with their reiterated aſſertions: they were diſcuſſing the teſtimony of the king's evidence; and what they probably ſaid, was deſigned to account to one another for his repreſentations. We are often led to repeat the ſtatements of others; and it very frequently happens that it is not ſufficient to give what we think their ideas. If we can give their words, every one may judge for himſelf as to the import of them: if we give merely our own ideas of their import, we preclude all correction of miſtake, if from our peculiar prepoſſeſſions, or any other circumſtances, we have erred. We have ourſelves known inſtances, and probably our readers can at once recollect others for themſelves, where very ſerious conſequences have followed from perſons detailing their own apprehenſions of the meaning of others, inſtead of what they actually ſaid: and from a regard to truth, and from the conſideration of ſuch painful occurrences, we feel perſuaded that the habit of the correct recollection of words ſhould be early made an object, and ſhould not be loſt ſight of in any part of education.

But beſides the directly mental effect of the correct recollection of words, and the importance of it in the concerns of life, we do not perceive how the neceſſity of it can be doubted in the various employments of a literary and ſcientific education. We have no wiſh that the memory ſhould be burdened with a number of rules and facts which are of no direct ſubſerviency to the objects of rational inſtruction; nor that it ſhould be called upon to acquire the principles of grammar, and ſtill leſs of philoſophy, without the continual exerciſe of the underſtanding: but though the judgment will afford material aid to the memory, even in the rudiments of the languages, and is of indiſpenſable utility to its exerciſe in every department of ſcience, yet the ready and accurate recollection of fundamental rules, of the flexions of words, of elementary principles, definitions, &c. is of ſuch ſignal, and almoſt eſſential, advantage, in the progreſs of education, that we cannot but ſuppoſe, either that thoſe who object ſo much to the frequent exerciſe of the memory on words, would not wiſh to be underſtood to the full extent of their own repreſentations, or otherwiſe, that they labour under a moſt material error, ariſing from ignorance as to what exerciſe of memory even a rational education requires, or from forgetfulneſs of thoſe proceſſes by which they have themſelves made acquiſitions which could not have been made without them.

The exertions of the memory may be claſſed in three diviſions, (as reſpects our preſent conſiderations,) thoſe in which it merely ſupplies materials for the judgment; thoſe in which it furniſhes the reſults of previous exerciſes of the underſtanding, (or at leaſt what have before been the objects of the underſtanding,) and in which the underſtanding ſhould ſtill be concerned; and thoſe in which the proceſſes of the memory are become habitual from conſtant employment, and go on "without our ſtopping to think." The laſt claſs is probably much more extenſive than is generally ſuppoſed; facility in arithmetic, and in the ſubordinate exerciſes in the languages, continually require ſuch an exertion of the memory, and where the memory has not been trained to it, the difficulties in theſe elementary acquiſitions are conſtantly felt. All the power which we wiſh the judgment to exerciſe in ſuch caſe, is a controlling power; to ſuggeſt errors and omiſſions, but not to direct what is right; and if the readineſs and accuracy of memory have not been early cultivated, ſay before the age of twelve or thirteen, it will often prove up-hill work to acquire facility in thoſe branches of knowledge which, from being of practical value, are of very frequent occurrence. One caſe has occurred to our own obſervation, in which the exceſſive fear of making the memory paramount inſtead of ſubordinate, led to ſuch a degree of ſlowneſs in every operation in which the judgment is not principally concerned, that the individual found ten-fold difficulties, where the memory of much younger companions (without blindfolding the judgment) ſuggeſted at once every thing that the circumſtances might require, and will doubtleſs enable them to ſucceed beſt in the uſual employments of life. Of courſe we ſhould prefer the cultivated judgment, with great heſitation of memory, to the moſt fluent memory without judgment: but fluency in memory may be acquired without ſacrificing the judgment; and who would then deſpiſe it? One leading object of the work of inſtruction, in the middle period of it, (perhaps from the age of eight to twelve or farther,) is to give by practice that facility of recollection which, if not acquired before the underſtanding is become ſomewhat mature, will ſeldom be acquired at all; and which, though always to be regarded as a ſubſervient quality, is of almoſt indiſpenſable utility in the concerns of life, and even in the employments and reſearches of ſcience.

The remarks in the laſt paragraph were ſuggeſted by what we are advancing on the memory of words, and chiefly refer to it. Words continually ſtand for many thoughts; and ſhort combinations of them frequently imply trains of reaſoning: but it is often ſufficient, for the purpoſes of education, and indeed all that is deſirable, that the memory ſhould ſuggeſt ſuch combinations, and afford the impreſſion of their accuracy, without the exerciſe of the underſtanding to ſhew the truth of them. Two inſtances will illuſtrate our meaning. The common rule of algebraic multiplication, "Like ſigns give plus, and unlike ſigns give minus," is in itſelf conſidered almoſt without meaning, and underſtood literally involves an abſurdity; and we would never teach it to a boy, without firſt ſhewing him that it is a convenient abridgment of a number of operations in algebraic multiplication, all of which are well-founded: but when he has once ſeen the univerſality of its application, we would then lead him to employ it without heſitation, and even without thought as to its meaning: of courſe, however, recommending that he ſhould never reaſon from it, but reſort to the facts themſelves as the foundation of inferences reſpecting the nature and combinations of algebraic quantities. But to take a more familiar inſtance; in common multiplication, where the multiplier conſiſts of ſeveral digits, we are directed to place the firſt figure of each product under the digit by which we multiply. Nothing can be eaſier, when the effect of multiplication by 10, 100, &c., and the nature of our numeration are well underſtood, than to underſtand the reaſon and meaning of the direction; but we ſhould not wiſh that the pupil ſhould continually revert to this explanation; it is ſufficient if he remember the fact diſtinctly, and at the time when it is wanted; and it would only ſerve to embarraſs, if the rationale were to be conſtantly brought into view.

Leaving out of conſideration all the intercourſes of life, in which the ready recollection of words is often the ſource of ſo much intereſt and delight, there is ſtill another point of view in which we feel the importance of the habit of recollecting words readily and accurately. Ideas fade from the memory much ſooner when they are not connected with words. In ſickneſs, and often in old age, the reaſoning powers become languid; and the vigour of the mind, which would ſupply a ſucceſſion of intereſting thoughts, is loſt under the preſſure of diſeaſe or gradual decay. In ſuch circumſtances the mind dwells upon the preſent impreſſions of pain, or weakneſs, and can ſcarcely raiſe itſelf above them; but if the memory have been well ſtored, in the early part of life, with uſeful and intereſting combinations of words, they will often recur, at ſuch periods, without an effort, and without fatigue, and furniſh objects of thoughts which will ſooth and even cheer. Thoſe who are ſubject to any degree of mental depreſſion, diſabling them from active efforts, to point out a channel for their thoughts, often find ſuch ſuggeſtions of the memory an important relief to them. And we need not ſay to thoſe of our readers who have a religious turn of mind, that theſe remarks are peculiarly applicable to thoſe devotional compoſitions and expreſſions, which, where they have been early and deeply impreſſed on the mind, occur at the call of aſſociation to ſupport, to ſtrengthen, and to comfort; and which, thus ſuggeſted by the memory, have in innumerable inſtances allayed the emotions of paſſion and deſire, or poured balm into the wounded heart.

Whether the memory ſhould ever be exerciſed on words which convey no idea to the mind, we do not venture to determine; but as far as our own experience goes, we ſhould be led to conclude that ſuch a cultivation of the memory can be of little ſervice in a rational memory of words. We have at leaſt obſerved, that where a boy has poſſeſſed great facility in committing to memory paſſages from the claſſics, without finding it neceſſary fully to underſtand them, (ſo that the recital of them went on with little if any aid from the underſtanding, but was effected by the mere dint of verbal recollection,) he has uſually found it much more difficult to remember paſſages from Engliſh writers, in which the meaning is obvious, though the modes of expreſſion are out of the common rounds. It appears to us, therefore, that exerciſes of the memory, in which the memory alone is employed, ſhould ſeldom be reſorted to, ſince it does not tend to produce that recollection of words which is ſubſervient to, and indeed accompanied with a recollection of notions and feelings. The firſt ſtage of recollection ſhould be accompanied with the direct exerciſe of the underſtanding: the formula of words may, by habit, ceaſe explicitly to excite the ideas which on reflection it would convey; but it ſhould not be attended with a feeling of unmeaningneſs or unintelligibility.

The only caſe (ſeparate indeed from the rudiments of language) in which it appears particularly expedient to exerciſe the memory upon words alone, is where, though they have no uſual connection with certain facts or truths, they ſerve, by an artificial connection, to bring thoſe facts or truths to recollection; and even here there is the feeling in the mind that they are merely abbreviated repreſentations of a more full combination of words, which is itſelf at once intelligible. We refer principally to ſuch contrivances as thoſe in Grey's Memoria Technica. Of courſe we would by no means recommend the employment of his method to any thing like the extent which he propoſes; but if it be of importance (as we are perſuaded it is) in the reading of hiſtory, that a few leading dates ſhould be well fixed in the mind, his method will be found of great utility by furniſhing an additional aid to the memory; and the mere tranſlation of his technical words, aſſiſts materially in the permanency of the recollection. Caſes may occur, though not very frequently, in which it will be very ſerviceable to bear in mind with minute exactneſs the latitude and longitude of places; and here alſo, the Memoria Technica may be found of conſiderable ſervice: but for the general purpoſes of geographical knowledge, there can be no doubt that much more benefit will be derived from forming in the mind a clear idea of the relative ſituation of places, by means of a familiar acquaintance with the globe, or even with maps. Little advantage can be expected from the extenſion of this method to aſtronomy, and other branches of phyſical ſcience; but if any circumſtances render it deſirable to retain with accuracy the ſize of the planets, their diſtances from the ſun, &c. or the ſpecific gravity of different bodies, Grey's contrivance will be found a uſeful aid, though we can never recommend the employment of it in ſcience, without a full previous acquaintance with the facts to which it relates, and a frequent explicit reference to them: in ſhort it ſhould always be employed merely to aid the remembrance of knowledge, not to enable the young to prate about objects of which they are really ignorant. It is well known to our mathematical readers that there are formulæ of eminent utility, in the remembrance of which the judgment can have little ſhare, and in which readineſs and accuracy of recollection are the chief objects; for inſtance, Napier's celebrated canons for the ſolution of right-angled ſpherical triangles. Here the ſhort ſentence, "the rectangle of the radius and the ſine of the middle part, is equal to the rectangle of the tangents of the extremes conjunct, or, of the coſines of the extremes disjunct," enables the calculator to ſolve with the greateſt eaſe every caſe of right-angled ſpherical trigonometry: but in the recollection of this comprehenſive canon, the underſtanding affords little, if any aſſiſtance; it is a technical formula, in which there is no opportunity of exerciſing the perception of truth, except by obſerving the truth of every claſs of proportions which may be derived from the application of it; when the truth of theſe has been demonſtrated, all we have to do is to remember the canon. In this and many other inſtances in the mathematical ſciences, a ready and accurate recollection of ſigns of ideas is of great ſervice; and we cannot have heſitation in maintaining, even from ſuch caſes alone, that it is deſirable to train the memory, among other objects, to the recollection of words, always indeed as ſigns of ideas, or abbreviated ſigns of thoſe which are immediately ſigns of ideas, and, as much as circumſtances will allow, with an explicit exerciſe of the underſtanding, but ſtill ſo as to make the exerciſe of the memory in theſe inſtances the primary conſideration. The occaſional utility of the recollection of ſuch abbreviations we have already ſufficiently adverted to; and we will only add one ſpecimen of the advantage even of the abbreviated ſtatement of theſe abbreviations. The formula of Napier is readily ſuggeſted to the mind by the memorial words *Tan con, Cos-Dis;* and when theſe are well fixed in the memory, and connected with the more expanded ſtatement of the canon, it is almoſt impoſſible that the mind ſhould ever be at any loſs in the recollection of the canon itſelf, or at leaſt of the import of it.

In caſes where verbal recollection is found to be an object of importance, the ſimpleſt and moſt correct modes of expreſſion ſhould be employed; and, when they are repeated, it ſhould conſtantly be done without variation in the order or ſelection of words. If we can reſort to the underſtanding to check or ſuggeſt the words, this is not of ſo much conſequence; but wherever the ready recollection of words is deſirable, for purpoſes of diſpatch and accuracy, this precaution will be found of great moment.

We do not mean to charge the later writers on education with being the ſole cauſe of that neglect of the exerciſe of verbal recollection, which, a few years ago, was prevalent and faſhionable at leaſt in domeſtic education, and which made its way into ſchools beyond what experience has ſhewn to be uſeful; but the unqualified language which has been uſed by perſons of intellectual eminence, aimed, perhaps in ſome caſes excluſively, againſt burdening the memory with ſounds unmeaning to the learner, and almoſt uſeleſs if they were underſtood, has in many inſtances been extended to all caſes of exact verbal recollection, and has cauſed great difficulties in the ſubſequent periods of education as well as in the purſuits of life. We think that Miſs Edgeworth ſtands chargeable with contributing to and ſupporting this error, not perhaps directly, but by the low eſtimation in which ſhe teaches us to hold the memory, and by the too unqualified manner of her generally excellent obſervations on the culture of it, and the ſubjection of it to the judgment; and we will not deny that we have been led much farther than we otherwiſe intended, by our opinion as to the impreſſion which many have derived from her chapter on the ſubject. Her own writings ſhew that ſhe herſelf poſſeſſes a judicious memory; but without more attention to the cultivation of the recollection of words than ſhe encourages, we feel perſuaded that few will obtain one ſo ſerviceable. There is in that chapter a great deficiency in preciſion and clearneſs; and it has conſequently been the ſource of much error, or at leaſt countenanced it: and the principle is often obvious, that exertion ſhould be exacted only by being made intereſting. Her concluſion, "that memory is chiefly uſeful as it furniſhes materials for invention," is one of thoſe extraordinary poſitions which can only miſlead perſons who can implicitly bow to authority, and who prefer quiet acquieſcence to the trouble of thinking. It has not unfrequently occurred to us, that it is happy for mankind that the human intellect is not generally to be moulded by theoriſts; and we have no doubt that in the common walks of life great numbers, not abſolutely illiterate, may be found, who, though they poſſeſs a tolerable ſhare of good ſenſe and judgment, never have had the merit of forming one new combination of ideas for themſelves, and who yet, by the aid of memory, guided, we allow, by the underſtanding, contrive to paſs through life with credit and utility. Viewing Miſs Edgeworth's poſition as limited to ſcience and literature, the ſubſerviency of the memory to invention is only one, and that not the moſt important department of its exertions; taken as we find it, without any reſtriction or explanation, the poſition is as unfounded as it is injudicious.

It is difficult, in education, to lay down any generally applicable rules, eſpecially if they require the ſpecification of ages; but we ſhould be inclined to divide the courſe of intellectual education into three periods, the firſt extending to about ſeven or eight; the ſecond to about twelve or thirteen; and the third to the time when direct inſtruction ceaſes. In the firſt, the exerciſes of the memory ſhould be conſtantly and directly ſubſervient to the culture of the underſtanding, and ſhould not be employed but where they can be made intelligible. In this period the chief object is to produce ideas, and to connect them with words, to cultivate the obſervation and the judgment, and to ſtore the memory with ideas without much regard to philoſophical principles of arrangement. Some notion of cauſation, however, begins very early in children; and where it can be brought into exerciſe judiciouſly, there appears no reaſon why it ſhould be neglected; but the common bond of union will be connection in time and place, and it is by theſe links of aſſociation principally that recollection will be firſt produced. In the ſecond period, though the exerciſe and culture of the judgment ſhould go on as ever, and even become a more prominent object of attention, yet the memory of words ſhould now be particularly cultivated. In the third period, the exerciſe of verbal recollection ſhould, we imagine, conſtitute a very ſubordinate object. The primary aim muſt then be, to ſtrengthen the judgment, to exerciſe the operations of reaſoning, to cultivate habits of correct generalization and claſſification; and, as the mind expands, to lay the foundation of that judicious ſelection and arrangement of the objects of the memory, which will make this faculty of the utmoſt utility in every valuable employment of the underſtanding, and indeed make every operation of the memory itſelf an important exerciſe of the judgment.

VIII. We now proceed to a few remarks on the cultivation of the *Underſtanding.* We employ this general term (though in reality it may truly be ſaid to comprehend all the preceding intellectual habits or faculties, principally with a view to thoſe operations, which are uſually referred to the heads of judgment and reaſoning, and to thoſe operations of the aſſociative power by which ideas are combined and aſſociated with words.

The foundation of an accurate, diſcriminating judgment, can only be laid in the acquiſition of clear perceptions. During the period of infancy (that is, before the uſe of words is underſtood), this is almoſt the ſole object of intellectual education; and where this is properly attended to, unleſs in very unfavourable circumſtances, the developement of the underſtanding will afterwards go on with ſucceſs. Where this has been neglected, the injurious effects are ſeldom completely remedied. The acquiſition of clear perceptions does not, however, neceſſarily introduce the operations of compariſon, diſcrimination, and judgment ; but when theſe are exerciſed, the perception is thereby rendered more acute and active. The perceptive powers are neceſſarily improved in proportion to the attention of the mind to the objects of perception ; and whatever excites the operations of the mind, is productive of that pleaſure which attends every natural and gentle exerciſe of the mental faculties, more or leſs in every period of life, but particularly in thoſe to which education is chiefly directed. Every ſuch exerciſe of the mental faculties in connection with the objects of perception, tends to excite the attention to thoſe objects, and conſequently to improve the perception. And thus it is, as in every period of the intellectual culture, that the proper exerciſe of one faculty tends to the general improvement of the mind. But to compare, to diſcriminate, and to judge, does not neceſſarily follow from the exerciſe of the perception. In the more complicated perceptions, numerous judgments are often included ; but for the formation of thoſe ſimple ones which are the firſt exerciſe of the mind, nothing more is requiſite than retention of ideas, and that elementary exerciſe of the aſſociative power by which two or more ideas, derived from the ſame or ſimilar objects, are connected with the appearance, &c. of the object, ſo as to be at once recalled by it, and by degrees combined with it : nevertheleſs, where the mind is active, and ſuitable opportunities are given, it very early begins to employ thoſe faculties of the mind on the notions preſented by the ſenſes. We have obſerved, even at the age of twelve months, inſtances of the moſt decided nature, proving the attentive examination and accurate diſcrimination of the objects of ſenſation. Among others, we recal to mind a little circumſtance which we obſerved with great ſatisfaction, where parental partiality was not concerned. A boy, of a fine intelligent caſt of countenance, but not at all able to ſpeak, had a ſtrawberry with its ſtalk on, and a red garden daiſy not fully opened, and which very much reſembled the ſtrawberry, placed before him. He had ſeveral times before eaten ſtrawberries, and of courſe had an infantine motive for diſcrimination. He looked firſt at one, and then at the other ; at laſt he took up the daiſy, but without putting it to his noſe or mouth, he continued obſerving it, and after ſome time he put it down and took up the ſtrawberry, which he almoſt immediately ate. Hence it might be ſuppoſed, on the one hand, that there was an operation of reaſoning ; and, on the other, that it was ſimply a judgment, formed by compariſon of the ſenſations.

The truth appears to lie between the two ſuppoſitions. As far as we can form an idea of the operation of the infant mind, the caſe was this. There certainly was conſiderable reſemblance between the two objects, or the child (whoſe diſcriminative powers were obviouſly clear) would have at once choſen the right one ; but having taken up the daiſy, it did not, on minute obſervation, preſent thoſe appearances which excited the connected pleaſurable feelings, already aſſociated with the conception and name of the ſtrawberry, and conſequently did not excite the diſpoſition to eat it. The judgment was not a direct intentional one, and conſequently differed from thoſe which we employ by the uſe of words ; but the proceſs was the ſame with that which continually takes place in our own minds. The rejection of the daiſy was in conſequence of the perception of diverſity, or at leaſt the want of perception of complete ſimilarity between the ſenſation and the conception which had been produced by the frequent ſight of the fruit. In this inſtance we have no doubt that words were employed to ſet the compariſon in motion. Children often underſtand many words before they can at all utter articulate ſounds. The child was probably told that one was a ſtrawberry and the other a daiſy, and that he might eat the ſtrawberry.

Such compariſons ſhould often be produced, but at firſt the objects ſhould, as much as poſſible, be ſuch, that the compariſon may be ſuggeſted by the wants of the caſe ; and it ſhould, conſequently, be always employed on objects which are completely within the graſp of the mind, at leaſt in the view which we wiſh to have taken of them. It would be abſurd, for inſtance, to lead a child to compare any of the qualities of a guinea and a ſhilling, but thoſe which are obvious to the ſight or the touch. Inſtances will be continually occurring (where proper room is given for the exerciſe of the faculties), in which compariſon will take place without any effort on the part of the parent ; but it will uſually be found expedient ſometimes to bring about the employment of the judgment directly ; and provided we take care never to make it painful, by diſpleaſure at inaccuracy, or by too much ſolicitude as to the reſult, it may be done with great advantage. We never can be without objects to exerciſe compariſon, when children underſtand the meaning of common words, even if they cannot themſelves properly employ them. The ſize of things, their colour, ſhape, ſmoothneſs, weight, &c. (according to the degree in which the underſtanding is developed, and the meaning of words underſtood), furniſh conſtant means for leading to obſerve reſemblances and differences in their various combinations ; and the perception of theſe conſtitutes diſcrimination.

Theſe things would doubtleſs appear trifling to many of our readers ; but in all probability thoſe who may conſult this article will view things in a different light. Diſcrimination of judgment is a quality than which no one is more eſſential in the purſuit of truth ; the ready perception of reſemblances among diverſities, and ſtill more the quick and accurate perception of diverſity in the midſt of reſemblances, conſtitute ſome of the moſt important operations of the underſtanding. And ſuch diſcrimination will uſually be produced, where the mind is awakened by having ſufficient ſcope and exerciſe of its faculties. We may often leave it to its own ſilent progreſs ; and if we encourage accurate and attentive obſervation, and the correct uſe of words, diſcrimination will, in all probability, be found to follow as a natural conſequence. But it muſt alſo be our endeavour, to awaken and exerciſe the mind by direct attention on our part ; and provided we meaſure our efforts by the degree in which the underſtanding is developed, and do not attempt to force it, but only to guide and employ it, we may reaſonably indulge the confidence that the work of education is going on ſucceſsfully, and that we are beginning a progreſs of intellect, from which the moſt ſatisfactory reſults may be expected.

This quality of accurate diſcrimination ſhould be kept in view and exerciſed in every part of education. It is, indeed, the foundation of clear ideas; and the acquiſition of whatever can be truly called knowledge depends moſt materially on the poſſeſſion of it. It is exerciſed by various objects of inſtruction; and in fact it often is this exerciſe which gives thoſe objects their leading value. Now, if we wiſh our children to think clearly, and to reaſon accurately, the works of thought and reaſoning muſt be attended to early. Thoſe who learn to think and reaſon comparatively late in life, have difficulties to overcome which can ſcarcely be appreciated by thoſe whoſe intellectual qualities have been early cultivated. And no ſenſible parent need deſpair on this point. The object to which we would urge, is not to communicate extenſive information; that will be gained, and beneficially gained, if the deſire of knowledge have been produced, and the qualities of mind, on which the acquiſition of knowledge depends, have been properly trained; we only wiſh that on thoſe objects which properly fall within the ſphere of capacity, during the early part of childhood, the obſervation ſhould be ſo exerciſed, that the power of diſcrimination ſhould be acquired. A few ſimple play-things, which a child has the opportunity of obſerving in every ſituation, the natural objects which ſurround us, and which uſually ſtrike the attention of a child, if he be allowed to obſerve, pictures of different kinds of animals, the letters of the alphabet, the diſſected map, &c. furniſh abundant opportunities for that diſcrimination, the cultivation of which we ſtrongly recommend, as lying at the foundation of every thing which is valuable in the moſt ſerviceable exerciſes of the judgment. All that is requiſite is, that we ſhould ourſelves be capable of diſcrimination; that we watch the opportunity, when the mind is alive, to encourage the obſervation, and to produce diſtinct and accurate perceptions. Our buſineſs is not to be continually making direct efforts, as in the later period of education, but to employ thoſe occaſions which ſo often preſent themſelves to the attentive parent, to lead to the exerciſe of thoſe qualities of mind which he knows to be of high importance. It ſcarcely matters what it is on which we do thus exerciſe them; provided always that we attend to the actual ſtate of the mental progreſs; circumſtances which, to unintereſted ſpectators, appear of the ſlighteſt poſſible moment, often to the judicious parent indicate the operation of ſome uſeful quality, and enable him to diſcover, more than any ſpecific directions can do, what will enable him to promote thoſe qualities of mind which he wiſhes to ſee poſſeſſed. The grand point to be kept in view is, that we do not aim, on any occaſion, to force the faculties, but to employ them as they advance in ſtrength and accuracy ſuitably to their progreſs, and to furniſh them with appropriate objects of exerciſe: and we may feel aſſured, that ſo long as thoſe qualities are exerciſed, the buſineſs of education is going on much better than if we were endeavouring to ſtore the memory with words to which indiſtinct ideas, or no ideas at all, are attached, or even to ſtore it with facts, however in themſelves conſidered uſeful and intereſting. We ought never to think the work of education going on, unleſs the operations of the underſtanding are in ſome way or other brought into exerciſe: and when they are, we may reſt fully ſatisfied. If the developement of the intellectual faculties is properly begun, it will go on by the mere influence of external impreſſions. Our buſineſs is to regulate and employ thoſe external impreſſions, ſo that their influence may be ſuited to the ſtate of the mind, and really productive of a ſuitable exerciſe of the underſtanding.

We ſhould aim not only to produce diſcrimination, but to lead to the habit of obſerving the grounds of diſcrimination, the particular qualities or circumſtances in which objects reſemble one another, and thoſe in which they differ. This is by no means a neceſſary effect of the perception of reſemblance or difference; and it is often but partially acquired; yet it is certainly eſſential to correct reaſoning, and may be properly included under the head of diſcrimination. Children very early acquire the power of finding out the grounds of difference and agreement: and the queſtions, In what are theſe two things alike? In what are they unlike? often ſerve, at the age of three or four years, to bring into exerciſe ſome of the moſt uſeful operations of the underſtanding. Every thing, in fact, which ſets children to think upon the objects of their ſenſations, and upon their ideas, is a moſt ſerviceable employment: and the more they are early led to think correctly, the more eaſy in the later periods of education will correct thought become.

It would often ſerve as an important guide, if parents would themſelves conſider what qualities, or faculties of mind, are brought into exerciſe by the different circumſtances which occur, by their own words to their children, and the modes of expreſſion which they encourage them to uſe. We ſhould always wiſh that intellectual education ſhould be made ſubſervient to moral education; but attention to the one would in no way interfere with attention to the other. A ſound, comprehenſive, vigorous, diſcriminating judgment, is ſurely of the firſt importance, both in a moral and in an intellectual point of view. There can be no doubt that much might be done towards the acquiſition of it, if parents kept it in ſight as the chief mental object, and regulated their direct efforts, and as much as might be controlled accidental impreſſions, with a view to the cultivation of it, uſing their own good ſenſe and patient obſervation as the beſt guides to the probable effect of each upon the mind.

IX. *Reaſoning*, or the drawing of inferences, is a proceſs which may be expected to go on ſucceſsfully where the judgment has been cultivated. It begins very early; indeed the mental proceſs is often independent of words. The direct exerciſe of it does not appear to be deſirable, till the mind has acquired ſome vigour; more eſpecially till the judgment has been tolerably cultivated, and a conſiderable acquaintance with words acquired: and this is the leſs neceſſary, becauſe in every part of early education, circumſtances of conſtant occurrence will continually bring the reaſoning faculty into exerciſe, and give it a right direction, if we avail ourſelves of the opportunities which they preſent. "Scarcely a day paſſes," ſays Miſs Edgeworth, "in which children do not make ſome attempt to reaſon about the little events which intereſt them, and upon theſe occaſions a mother who joins in converſation with her children may inſtruct them in the art of reaſoning without the parade of logical diſquiſitions."

As the mind expands, the objects of the reaſoning faculty, of courſe, increaſe in number and frequency of occurrence. And the judicious parent, without making it a formidable object, may exerciſe it effectually. Two points, which are of univerſal application, ſhould, however, be always kept in view; that the premiſes ſhould be thoroughly underſtood, and this previouſly to the employment of them in the act of reaſoning; and that the aſſent of a child to the concluſion ſhould never be exacted, when there is any heſitation. It is too much to expect from a child, that the concluſion ſhould be admitted, if the underſtanding is to be exerciſed upon the premiſes alſo: and as we cannot force the reaſoning powers, and cannot compel a child to ſee the juſtneſs of our reaſonings, we ſhall either lead him to falſehood by too great eagerneſs, or to aſſent upon our authority and not upon the effect of the premiſes; or, we ſhall confuſe his underſtanding, and really prevent that effect which would otherwiſe have readily followed.

Single acts only of reaſoning ſhould be exerciſed in the early periods of education. We do not mean that one inference ſhould never be made to follow another, after the underſtanding had previouſly acquired ſome ſtrength and clearneſs: but that, if ever a train of reaſoning be employed, it ſhould, in fact, be made to conſiſt of ſingle unconnected reaſonings in the firſt place. The links ſhould be all comprehended ſeparately before they are faſtened together. When a child is ſo far advanced as to be able to purſue a train of premiſes and concluſions, there can be no loſs for ſubjects on which to exerciſe the reaſoning faculty: the fields of mathematical ſcience will by that time be opening, and they will exerciſe it, and, at the ſame time, guide it.

It appears that, in general, the true method of teaching to reaſon accurately, is to accuſtom children to accurate reaſoning. Long before they can form inferences for themſelves, they can underſtand the inferences of others; and the grand point is, that the reaſonings which we employ to them ſhall be fully intelligible and thoroughly juſt. If we are ſophiſtical with them, it is too much to expect that they will grow up in habits of clear and correct reaſoning. If we make a point of going no farther in our concluſion than our premiſes will warrant, they will gradually acquire a kind of tact, which may be conſidered as forming a part of good ſenſe, which will effectually prevent them from feeling ſatisfied with falſe reaſoning, even though they could not detect the grounds of the ſophiſtry.

Parents muſt often require the aſſent of their children on the ſcore of authority. They will naturally believe implicitly, if the truth is always ſpoken to them; and it is ſometimes impoſſible to give them any reaſon which would be intelligible and ſatisfactory to themſelves in reply to their queſtion, Why? or, Why not? We prefer that children ſhould be troubleſome ſometimes with theſe enquiries, rather than that they ſhould not themſelves be accuſtomed to think; and if a parent has, by judicious management, acquired the confidence of his children, it will generally be ſufficient for him to ſay, "It is not always neceſſary that I ſhould tell you the reaſon of what I deſire you to do; I wiſh you to do it:" and in ſome caſes, indeed, not unfrequently, it may be expedient to ſtate what is often the matter of fact, "You are not old enough to underſtand the reaſon, if I were to tell it to you: when you have more knowledge and underſtanding, I ſhall be able to tell you the reaſons of thoſe things better than I can now." But after all, if aſſent, or obedience, be required on the ground of authority and confidence, let the ground of reaſoning be kept out of view. If we once make any thing depend upon our reaſoning being underſtood, let it be kept to that point. We may often aſſent to the concluſion as an inſulated truth; but we never can aſſent to it as an inference, unleſs the reaſoning is properly underſtood.

It may be doubted whether it is deſirable to give ſpecimens of ſophiſtry to children, before they are really capable of entering into the ground of the ſophiſtry. But if ever we find them drawing falſe concluſions, then is the time to ſhew them, if poſſible, how and why they are falſe. And it is highly deſirable that we ſhould accuſtom them to caution in their inferences. It is better that they ſhould ſometimes reaſon very erroneouſly, and draw very erroneous concluſions, than that they ſhould never reaſon at all; and it is by no means to be expected, or even wiſhed, that their inferences ſhould be always accurate: it is not to be wiſhed, becauſe we ſhould then have reaſon to apprehend, that the inference was an act of memory rather than of the underſtanding; and it cannot reaſonably be expected, becauſe the power of reaſoning juſtly depends upon the degree in which the terms of the premiſes are clearly and fully underſtood, and alſo requires, for the acquiſition of it, a long courſe of exerciſe. Nevertheleſs, the habit ſhould be early produced of caution in receiving or in drawing inferences. We would never have children ſuſpect the accuracy of their parents; but we ſhould ſhew them in what they hear (if it can be done with prudence), and ſtill more in their own little reaſonings, thoſe defects which their minds are ſufficiently cultivated to perceive. And without giving riſe to a habit of indeciſion, (which ſometimes is as injurious as a habit of preſumption,) we ſhould aim to lead them to take as many circumſtances as poſſible into account, and not to be too decided with reſpect to inferences which may be drawn from them. If a child once ſees that he has inferred too much, it will effectually keep him, for a time at leaſt, from preſumption, eſpecially in oppoſition to the inferences of others.

In order to acquire that freedom from the influence of authority which is often neceſſary to ſucceſs in the purſuit after truth, it is requiſite that children be accuſtomed, and encouraged, to ſtate their difficulties and objections againſt any reaſoning or aſſertion which they hear or meet with in books. We have no wiſh to ſee the habit of objecting for the ſake of objecting: but thoſe are the moſt likely to acquire it, who have been accuſtomed to think but little when young, and to take every thing upon truſt. Having believed every thing upon authority, when their minds acquire ſome degree of independence and activity, they uſually find, or think they find, that many of thoſe things which they have believed are inconſiſtent with truth, and they feel a kind of general ſuſpicion, with reſpect to all which they have been aocuſtomed to believe; and the conſequences often are highly injurious both with reſpect to the underſtanding and the conduct. Though we wiſh to ſee an unbounded confidence in parental declarations, and unlimited ſubmiſſion to parental authority, yet a parent ſhould employ each only for the good of his children. It will not excite ſuſpicion, if he ſometimes lead them to perceive, that he is not equally ſure of every thing that he tells them; that when they grow older they will perhaps underſtand ſome things better even than himſelf; and that at any rate they muſt learn to think for themſelves, ſince he ſhall not always be at hand to inſtruct and guide them. He will always point out, or, what is better, lead them to find out, errors in reaſoning, &c. in the books which they read, eſpecially though the writers were men of great eminence. He will accuſtom them to think for themſelves; but at the ſame time he will make them underſtand that they are not to reject every thing becauſe they ſee that ſome things are erroneous. If the mind have been rightly trained, while its education is principally conducted by others, things will go on well when the individual has, as it were, to educate himſelf. If by early diſcipline, followed up by the well regulated purſuit of uſeful knowledge, he have been brought into that invaluable ſtate of mind, in which freedom of thought is united with caution, and a tendency to ſuſpect one's own concluſions, at leaſt as much as thoſe of others, it may reaſonably be expected that the acquiſition of truth will be an eaſy taſk, and that the judgment will have that clearneſs, activity, and correctneſs, which will enable the poſſeſſor to chooſe important objects, and to purſue them by ſuitable and judicious means.

X. After all, perhaps, the moſt important object in early intellectual education, next to the cultivation of the perception, is that which reſpects *Words:* at leaſt, this is of eſſential importance. A clear and correct underſtanding of the force of words, is of the utmoſt conſeqcence in every period of the intellectual progreſs. On the care which is early taken in furthering this object, depend, in a great meaſure, the future developement of the underſtanding and the acquiſition of knowledge. A well-educated child will always heſitate to uſe words which he does not ſo far underſtand as to be able to feel their force in the particular connection: and in many inſtances this is all which can be underſtood by a child. The names of external objects, are, of courſe, the firſt words which are acquired and underſtood: and here all is plain. Either the things themſelves can be ſhewn, and the words connected with them; or pictures can be employed to repreſent to the mind what cannot be directly made the ſubject of perception. In like manner, names denoting the actions of animated objects, and the changes which take place among inanimate objects, the ſenſible qualities of the different ſubſtances around, and, in ſhort, any thing which can be made the ſubject of direct ſenſation, or can be repreſented to the ſight, are calculated for the early exerciſe of the aſſociative power. And it is in the application of theſe, that the earlieſt efforts of claſſification are employed. The ſame name is unavoidably given to a variety of things or animals agreeing in ſome particulars; and indeed this circumſtance is of the utmoſt conſequence to the progreſs of intellect. It may be truly ſaid, that without general terms little knowledge could be acquired, that there would be almoſt a total ſtop to every proceſs of mind not immediately depending upon ſenſation. In the firſt periods of language the buſineſs of claſſification, and the application of general terms, went on together; the proceſſes of claſſification are now, however, in innumerable inſtances, directed by the cuſtomary mode of applying the terms. Still the application of them is accompanied with claſſification; and when the mind is, in ſome inſtances, a little familiarized with the operation, it acquires, with great eaſe, the mode of applying general terms in others. This is an excellent and important exerciſe of the judgment; and it leads to notice circumſtances of agreement and circumſtances of difference, which is in itſelf a highly uſeful employment of the underſtanding. In ſome inſtances children cannot but be puzzled, either by the unavoidable irregularities of language, or by the application of terms depending upon little niceties which cannot be expected to lie within the ſphere of their obſervation; but wherever the grounds of the application can be ſhewn, it will always furniſh a uſeful exerciſe of the mind to be led to obſerve them as ſuch.

We have already referred to the great importance of the mathematical ſciences in training the mind to habits of correct reaſoning; indeed it is by the various acquiſitions of knowledge, that the different mental faculties are developed and cultivated; and we fully expect the concurrence of our readers when we ſay, that an early and accurate acquaintance with our arithmetical notation and numeration, is peculiarly calculated to lay the foundation of habits of preciſion, of arrangement and claſſification. Our notation took its riſe in the neceſſities of circumſtances, operating upon thoſe powers and qualities of mind which are poſſeſſed by every human being; but it is an object worthy of the attentive examination of the philoſopher, while, at the ſame time, from its diſtinctneſs and ſimplicity, it ſerves as a moſt important exerciſe to the juvenile underſtanding. A child, early made familiar with the ſimple operations of arithmetic, (taught, not technically, but by a conſtant reference to the principles on which they are founded, and particularly to thoſe of the notation, on which in ſhort the whole depends,) can ſcarcely fail to form ſome preciſe ideas, and to acquire a tendency to arrangement and method, which will almoſt inevitably lead on to a ſimilar employment of the underſtanding in other circumſtances. It may not perhaps be known to all our readers, that there is an excellent poſthumous work of Condorcet, which will furniſh ſome highly valuable information to the intelligent parent, on the beſt means of communicating an acquaintance with the firſt principles of arithmetic. It is entitled, "Moyens d'apprendre à compter ſurement et avec facilité." If it were more the object of early education to cultivate the faculties of the mind, rather than to ſtore the memory with words, or with ideas, which are of little importance except ſo far as they are made an exerciſe of the underſtanding, this little tract would not have been ſo long left inacceſſible to the mere Engliſh reader. The French editor juſtly remarks, that the firſt thing which diſtinguiſhes theſe elements of arithmetic, is, that they are at the ſame time the elements of the art of reaſoning. The uſual formulæ of arithmetic are founded upon principles and proceſſes which can generally be made intelligible to thoſe who are capable of employing them; but the formulæ do not of themſelves ſufficiently exerciſe the underſtanding: they are a ſpecies of machinery with which we operate almoſt mechanically. But in ſo far as thoſe principles and proceſſes are made intelligible and familiar, the judgment is cultivated, the reaſoning powers are exerciſed, diſtinct ideas are gained, and the commencement made of thoſe intellectual operations and habits, which are ſubſervient to the higheſt purſuits of knowledge, and to the beſt conduct of life.

While we thus recommend the early employment of the underſtanding upon numbers, we ought not in juſtice to ourſelves to omit mentioning, that natural hiſtory furniſhes ample ſcope for the exerciſe of the intellect on things, on words, and in claſſification; and in ſome reſpects it is a more uſeful object of early mental culture; it brings into exerciſe the habit of obſervation, while it equally requires and more rewards the attention; it gives more room for the exerciſe of the memory, and is more calculated to ſet the mind at work, and ſupplies more numerous and intereſting ſubjects for its operations. "The art of forming a ſound and active underſtanding," ſays Miſs Edgeworth, "conſiſts in a due mixture of facts and reflection. Dr. Reid has, in his Eſſay on the Intellectual Powers of Man, p. 297, pointed out, with great ingenuity, the admirable economy of nature in limiting the powers of reaſoning during the firſt years of infancy. This is the ſeaſon for cultivating the ſenſes, and whoever, at this early age, endeavours to force the tender ſhoots of reaſon, will repent of his raſhneſs." We have not yet been able to meet with the paſſage to which Miſs Edgeworth refers in our 8vo. edition of Reid; but we are fully convinced that ſhe cannot go the whole lengths of that philoſopher, reſpecting the degree in which the reaſoning faculty is naturally developed, or rather lies undeveloped, during *childhood:* as we have already remarked, children reaſon much more than is uſually ſuppoſed: and provided we are cautious in giving due vigour to the obſervation and judgment, we may ſometimes directly employ the reaſoning faculty, under the reſtrictions which we have already pointed out. Perhaps, however, it is better to be ſatisfied with thoſe proceſſes of reaſoning, which, where the mind is healthy, will almoſt inevitably follow the exerciſes of the obſervation and recollection, and make no direct effort to cultivate the reaſoning faculty, than to aim to bring it forwards prematurely; and it was with a view to this principle, that we have thought it deſirable to ſubjoin the foregoing remarks to what we have ſaid on attention to numbers.

In many caſes the force of words can only be learnt gradually, by their uſe in various connections: to attempt to explain connectives, for inſtance, by aſſigning their abſtract force, would be utterly uſeleſs to a child; the force of them muſt be ſhewn in particular caſes, and from theſe the mode of applying them, and the force of them will be learnt in others. Similar remarks may be made with reſpect to all abſtract terms: and provided we are careful ourſelves to employ them properly, and to take every opportunity of ſhewing the force of them when level to the capacity or progreſs of the individual, we do all which is neceſſary, and probably do better than by attempting to do more.

Though we fully calculate on our readers going along with us, reſpecting the abſolute neceſſity of early accuſtoming the mind to ſeek for, and to acquire, clear ideas in connection with the ſigns of ideas, the following remarks of Mr. Locke may ſerve to corroborate their opinions; and, together with what we ſhall alſo quote from Miſs More, may lead them to make it an object of daily, indeed conſtant, aim in the buſineſs of education, not merely as of great moment in intellectual cultures, and to ſmooth the way for intellectual acquiſitions, but as incumbent on every one who has in view the moral welfare of his child. "Perſons having been accuſtomed from their cradles," ſays our great philoſopher, "to learn words before they knew the ideas for which they ſtand, uſually continue to do ſo all their lives, never taking the pains to ſettle in their minds the determined ideas which belong to them. This want of a preciſe ſignification in their words, when they come to reaſon, eſpecially in moral matters, is the cauſe of very obſcure and uncertain notions. They uſe theſe undetermined words confidently, without much troubling their heads about a certain fixed meaning, whereby, beſides the eaſe of it, they obtain this advantage, that as in ſuch diſcourſe they are ſeldom in the right, ſo they are as ſeldom to be convinced that they are in the wrong, it being juſt the ſame to go about to draw thoſe perſons out of their miſtakes, who have no ſettled notions, as to diſpoſſeſs a vagrant of his habitation who has no ſettled abode. The chief end of language being to be underſtood, words ſerve not for that end when they do not excite in the hearer the ſame idea which they ſtand for in the mind of the ſpeaker."

"I have choſen," adds Miſs More, after making the foregoing extract, "to ſhelter myſelf under the broad ſanction of the great author here quoted, with a view to apply this rule in philology to a moral purpoſe; for it applies to the veracity of converſation as much as to its correctneſs; and as ſtrongly recommends unequivocal and ſimple truth, as accurate and juſt expreſſion. Scarcely any one perhaps has an adequate conception, how much clear and correct expreſſion favours the elucidation of truth; and the ſide of truth is obviouſly the ſide of morals; it is in fact one and the ſame cauſe; and it is of courſe the ſame cauſe with that of true religion alſo.

"It is therefore no worthleſs part of education, even in a religious view, to ſtudy the preciſe meaning of words, and the appropriate ſignification of language. To this end, I know no better method, than to accuſtom young perſons very early to a habit of defining common words and things; for, as definition ſeems to lie at the root of correctneſs, to be accuſtomed to define Engliſh words in Engliſh, would improve the underſtanding more than barely to know what thoſe words are called in French, Italian, or Latin. Or rather, one uſe of learning other languages is, becauſe definition is often involved in etymology, that is, ſince many Engliſh words take their derivation from foreign or ancient languages, they cannot be ſo accurately underſtood without ſome knowledge of thoſe languages; but preciſion of any kind, either moral or philological, too ſeldom finds its way into the education of women."

If any of our readers wiſh for an exemplification of the method of teaching to define, we refer them, with complete ſatisfaction, to the excellent little work called "Evenings at Home;" the attentive peruſal of which muſt furniſh to the judicious parent, many uſeful reflections and hints calculated to facilitate his views in intellectual education. We may mention in paſſing, that we cannot but conſider it as a duty which the reſpectable author owes to the public, to make thoſe alterations in the chemical articles which may adapt it more to the preſent ſtate of the ſcience; and we are perſuaded that he could not render a more uſeful ſervice to the riſing generation, than by ſome ſupplementary volumes on other points of natural hiſtory and phyſiology, and natural philoſophy, calculated, as thoſe preceding eminently are, to convey clear ideas, and to exerciſe the underſtanding. We need ſcarcely add, that the mathematical ſciences furniſh moſt important leſſons in the art of defining, and ſome of the fineſt and moſt uſeful ſpecimens of it.

With reſpect, however, to the plan of definitions, we muſt again obſerve, that in a great variety of inſtances we muſt reſt ſatisfied with perceiving that the force of a word is clearly underſtood in the particular caſe; and we muſt ſometimes require even leſs than this. Words which are the moſt forcible to our minds, in conſequence of numerous aſſociated thoughts and feelings, often can ſcarcely affect the mind of a child. The force of thoſe which repreſent very complex ideas (as moſt general terms do), muſt generally be acquired ſlowly, by the impreſſions derived from the manner of their employment, and the inſtances of their application. But wherever the force of a word can be explained, ſo as to be made intelligible, this ſhould be done; and there can be no doubt that the habit ſhould be formed as early as poſſible, of never reſting ſatisfied without ſome ideas connected with the words which occur in books on converſation. We have ourſelves had an opportunity of obſerving the great value and force of this habit. A young perſon, who, in the courſe of his reading aloud with his early inſtructor, had uniformly been called upon to try to explain the meanings of words, and in caſe of failure had as uniformly been ſent to ſearch for a ſuitable explanation in a good dictionary which was always at hand, by degrees became ſo much accuſtomed to this exerciſe of the underſtanding, that, when arrived at years of maturity, he felt a kind of internal compulſion to reſort to the ſame means of information, when he could not otherwiſe aſcertain to his ſatisfaction the force of a word in a given ſituation, which feeling generally overcame the reluctance of indolence, and even the eagerneſs which ſo often urges on the ardent mind towards that which is yet unexplored. The effect of ſuch diſcipline upon the habit of diſcrimination and clearneſs of intellect need not be pointed out. It can ſcarcely fail to bring the mind into the right ſtate for the ſearch after truth; and even if only defective ideas are thus acquired, yet if correct as far they go, the grand point is gained. After ſuch habitual culture of the mind, the want of ſomething upon which the underſtanding may reſt with ſatisfaction is conſtantly felt; and if the whole truth is not graſped, the acquiſitions actually made will uſually be on the ſide of truth.

It appears highly inexpedient to attempt, in the early periods of the mental progreſs, to give the moſt comprehenſive meanings of words. The firſt buſineſs in the early acquiſition of knowledge, is to begin with individuals, and after a ſuitable acquaintance has been gained with them, to go on to general facts and ſtatements. In like manner with reſpect to words, it is ſufficient if we can give a clear idea of the ſignification of a word as it occurs: it will afterwards be an excellent employment of the underſtanding to combine theſe meanings together, ſo as to generalize the term; and where the mind has been well cultivated, this will be done almoſt without our direct efforts. But it ſhould not unfrequently conſtitute a direct exerciſe in the more advanced periods of education, to trace out that common ſignification which a word has throughout all its varieties of ſignification; and previouſly to this, it is deſirable to accuſtom the young to expect that the particular force of a word which they have acquired is by no means the only one, and to be ready to receive the change of meaning which the circumſtances of the connection may require, or which the writer may, by his definitions, endeavour to communicate to his readers.

The wrong application of words is one of the chief obſtacles in the acquiſition of knowledge, and conſtitutes the cauſe of ſome of our earlieſt and ſtrongeſt prejudices. By the magic power of aſſociation, not only do the connections of ideas ſuggeſt combinations of words, but combinations of words, in innumerable inſtances, produce connections of ideas. And this ought to furniſh to the early inſtructor, a powerful motive to caution in the employment of words; ſo that, in his communications with his pupils, he may avoid, not only thoſe modes of expreſſion which are in themſelves calculated to convey wrong ideas, but thoſe alſo which muſt convey wrong ideas in conſequence of the partial knowledge poſſeſſed by thoſe who hear them. It ſhould be a leading object, in every department of education, ſince it is totally impoſſible to give full and complete ideas, to render thoſe which we can communicate clear and correct. Where this object is ſteadily purſued, the underſtanding may be expected for itſelf to ſeek, and will, in all probability, acquire all which is neceſſary beyond.

But notwithſtanding all the care and ſelf-culture of parents and inſtructors, numerous erroneous aſſociations will be formed or imbibed, which will warp the judgment from the perception of truth, and ſometimes obſcure it. A large proportion of them operate through the medium of the affections; and ſome attention will be paid to theſe under the head of MORAL *Education*; but ſtill many remain which ariſe from the ambiguities of language, from partial obſervation, from accidental combinations of external objects, &c. Theſe will often give way to the gradual developement of the mental faculties, and the acquiſition of knowledge; but ſometimes theſe irregular aſſociations will continue for a long period to perplex and miſlead the underſtanding. It is highly deſirable, therefore, to watch for them, and, where they are diſcovered, to take ſuitable means for deſtroying them. When we perceive a want of readineſs to admit obvious truths which are level to the progreſs of the intellect, we may uſually conclude that ſome incorrect idea has been connected with the words employed. Sometimes the immediate end may be gained by a change of words; but it is, perhaps, generally preferable to endeavour to enter into the little mind and trace its errors and their ſources. We remember once diſcovering that a child had formed the prepoſterous idea, that the duſt which flies about in the road is in part compoſed of the particles of the human body; an idea derived (by ſome proceſs of reaſoning, which we do not now recollect, aided no doubt by an effort of the imagination,) from impreſſions received from the words in the burial ſervice, "duſt to duſt." Here, and in ſimilar caſes, to diſcover the link and to ſeparate it, are almoſt the ſame thing. It is one great advantage of domeſtic education, that it enables the parent or inſtructor to watch over the early aſſociations, and to prevent the formation, or effect the diſunion, of many which are injurious to the acquiſition of knowledge, and what is ſtill more important, unfriendly to the moral judgment, and to the happineſs of the individual. To have the power of availing themſelves of this advantage, however, parents muſt accuſtom their children to view them as friends, to open their little minds to them with the utmoſt confidence; they muſt treat their erroneous judgments with mildneſs, and be habitually careful in their own modes of expreſſion in their preſence, and eſpecially in their direct communications with them.

Before quitting the ſubject of words we would add, that it is very deſirable to accuſtom children to the peculiar terms of ſcience and art, as ſoon as they can underſtand their meaning. In very many inſtances this can be done with eaſe, not as a formal object, but in the courſe of converſation, or while explaining what is met with in books. When the terms are become familiar, and are pretty well underſtood, the difficulties attending the acquiſition of any ſcience are greatly leſſened. Even familiarity with the mere words employed, is of ſome ſervice when we begin a new branch of knowledge; but in many caſes even clear ideas may be early obtained in connection with ſcientific language, which will effectually prepare the way for future progreſs. Suppoſe, for inſtance, the leading terms of geometry are early explained, by means of figures or models, not only will the underſtanding receive ſome exerciſe by the acquiſition of diſtinct ideas in connection with words, but it will be ready whenever the reaſoning powers are ſufficiently matured to be directed to geometry, to enter upon the field without that perplexity which is ſo often produced by the multitude of new words as well of new ideas. The utmoſt care ſhould, however, be taken to make our explanations correct as far they go. If poſſible, children ſhould have nothing to unlearn; and though we cannot effect this completely, yet more depends than is uſually ſuppoſed upon thoſe who have to guide the early aſſociations and mould the habit; and the leſs error enters the mind, the more readily will truth find admittance.

XI. "It is more likely," ſays Miſs Edgeworth, "that *wit* ſhould be engrafted upon judgment, than that judgment ſhould be engrafted upon wit." Numerous excellent obſervations may be found in her Practical Education reſpecting the cultivation of the underſtanding; we ſhall conclude what we have advanced on the ſubject, by quoting her very judicious remarks on the ſubject of the early cultivation of wit.

"We have adviſed, that the judgment of children ſhould be exerciſed upon the objects of their ſenſes. It is ſcarcely poſſible that they ſhould reaſon upon the ſubjects which are ſometimes propoſed to them: with reſpect to manners and ſociety, thay have had no experience, conſequently they *can* form no judgment. By imprudently endeavouring to turn the attention of children to converſation that is unſuited to them, people may give the *appearance* of early intelligence, and a certain readineſs of repartee and fluency of expreſſion; but theſe are tranſient advantages. Smart, witty children amuſe the circle for a few hours, and are forgotten; and we may obſerve, that almoſt all children who are praiſed and admired for ſprightlineſs and wit, reaſon abſurdly, and continue ignorant. Wit and judgment depend upon different and oppoſite habits of mind. Wit ſearches for remote reſemblances between objects or thoughts apparently diſſimilar. Judgment compares the objects placed before it, in order to find out their differences rather than their reſemblances,

blances. The compariſons of judgment may be ſlow; thoſe of wit muſt be rapid. The ſame power of attention in children may produce either wit or judgment. Parents muſt decide in which faculty, or rather, in which of theſe habits of the mind, they wiſh their pupils to excel; and they muſt conduct their education accordingly. Thoſe who are deſirous to make their pupils witty, muſt ſacrifice ſome portion of their judgment to the acquiſition of the talent for wit; they muſt allow their children to talk frequently at random. Amongſt a multitude of hazarded obſervations, a happy hit is now and then made: for theſe happy hits children who are to be made wits ſhould be praiſed; and they muſt acquire ſufficient courage to ſpeak from a curſory view of things; therefore the miſtakes they make from ſuperficial examination muſt not be pointed out to them; their attention muſt be turned to the comic rather than to the ſerious ſide of objects; they muſt ſtudy the different meanings and powers of words; they ſhould hear witty converſation, read epigrams and comedies: and in all company they ſhould be exerciſed before numbers in ſmart dialogue and repartee.

"When we mention the methods of educating a child to be witty, we at the ſame time point out the dangers of this education: and it is but juſt to warn parents againſt expecting inconſiſtent qualities from their pupils. Thoſe who ſteadily prefer the ſolid advantages of judgment to the tranſient brilliancy of wit, ſhould not be mortified when they ſee their children, perhaps, deficient at nine or ten years old in the ſhowy talents for general converſation; they muſt bear to ſee their pupils appear ſlow; they muſt bear the contraſt of flippant gaiety and ſober ſimplicity; they muſt purſue exactly an oppoſite courſe to that which has been recommended for the education of wits; they muſt never praiſe their pupils for hazarding obſervations; they muſt cautiouſly point out any miſtakes that are made from a precipitate ſurvey of objects; they ſhould not harden their pupils againſt that feeling of ſhame which ariſes in the mind from the perception of having uttered an abſurdity; they ſhould never encourage their pupils to play upon words; and their admiration of wit ſhould never be vehemently or enthuſiaſtically expreſſed."

XII. *Imagination* reſpects the thoughts and the feelings. Conſidered in reference to the conceptions and trains of thought, it properly falls under the head of Intellectual Education: conſidered in reference to pleaſure and pain, it comes under the head of Moral Education. How the imagination affects the moral judgments, and what influence its pleaſures and pains have upon the happineſs of life, how they are to be cultivated, and how regulated, will probably be the ſubject of ſome remarks in a ſubſequent article: our buſineſs in this will be very brief.

Conſidered as an intellectual faculty, as aſſiſting to raiſe the mind above mere ſenſation, as preſenting to the mind conceptions, or trains of conceptions, which are not immediately derived from ſenſation, (though of courſe compoſed of the elements which ſenſation furniſhes,) as forming new combinations of ideas, or as ſuggeſting the grounds of reaſoning, the operations of the imagination are very important, and indeed not only powerfully aid the exerciſe of the judgment, and the purſuits of philoſophy, but are even eminently ſubſervient to the cauſe of morality. Mr. Stewart furniſhes us with many admirable obſervations, which will aſſiſt in ſhowing the point to which we ſhould endeavour to raiſe the imagination, as well as the limits which we ſhould aim to preſcribe to it; and from theſe we ſhall ſelect the following, as immediately bearing upon our object:

"Point out to two men," ſays this elegant and intereſting writer, "any object of compaſſion;—a man, for example, reduced by misfortune from eaſy circumſtances to indigence. The one feels merely in proportion to what he perceives by his ſenſes. The other follows, in imagination, the unfortunate man to his dwelling, and partakes with him and his family in their domeſtic diſtreſſes. He liſtens to their converſation while they recal to remembrance the flattering proſpects they once indulged; the circle of friends they had been forced to leave; the liberal plans of education which were begun and interrupted; and pictures out to himſelf all the various reſources which delicacy and pride ſuggeſt, to conceal poverty from the world. As he proceeds in the painting, his ſenſibility increaſes, and he weeps, not for what he ſees, but for what he imagines. It will be ſaid, that it was his ſenſibility which originally rouſed his imagination; and the obſervation is undoubtedly true; but it is equally evident, on the other hand, that the warmth of his imagination increaſes and prolongs his ſenſibility.

"The foregoing obſervations may account, in part, for the effect which exhibitions of fictitious diſtreſs produce on ſome perſons who do not diſcover much ſenſibility to the diſtreſſes of real life. In a novel or a tragedy, the picture is completely finiſhed in all its parts; and we are made acquainted, not only with every circumſtance on which the diſtreſs turns, but with the ſentiments and feelings of every character with reſpect to his ſituation. In real life we ſee, in general, only detached ſcenes of the tragedy; and the impreſſion is ſlight, unleſs imagination finiſhes the characters, and ſupplies the incidents that are wanting.

"It is not only to ſcenes of diſtreſs that imagination increaſes our ſenſibility. It gives a double ſhare in the proſperity of others, and enables us to partake, with a more lively intereſt, in every fortunate incident that occurs either to individuals or to communities. Even from the productions of the earth, and the viciſſitudes of the year, it carries forward our thoughts to the enjoyments they bring to the ſenſitive creation, and by intereſting our benevolent affections in the ſcenes we behold, lends a new charm to the beauties of nature.

"I have often been inclined to think, that the apparent coldneſs and ſelfiſhneſs of mankind may be traced, in a great meaſure, to a want of attention and a want of imagination. In the caſe of misfortunes which happen to ourſelves, or to our near connexions, neither of theſe powers is neceſſary to make us acquainted with our ſituation; ſo that we feel, of neceſſity, the correſpondent emotions. But without an uncommon degree of both it is impoſſible for any man to comprehend completely the ſituation of his neighbour, or to have an idea of a great part of the diſtreſs which exiſts in the world. If we feel therefore more for ourſelves than for others, the difference is to be aſcribed, at leaſt partly, to this, that, in the former caſe, the facts, which are the foundation of our feelings, are more fully before us than they poſſibly can be in the latter."

The power of forming vivid and accurate conceptions is an important acquiſition; but the true foundation of it is only to be laid in clear diſtinct perceptions; and if the imagination early gain ſuch influence as to call off the mind from obſervation, the moſt injurious effects may be expected to follow. The exerciſe of the imagination, (including, as is generally done, what Mr. Stewart denominates the conception,) is neceſſary to enable us to enter into the reaſonings of the philoſopher, where theſe reſpect individuals, as well as into the pictures of the poet, and the details of hiſtory. In reference to this laſt head, we may be allowed here to mention, that the conception aids the cauſe even of religious truth: for he who is not able, or who does not take the trouble, to picture to the mind's eye the ſtatements of the goſpel hiſtorians, will not have his judgment ſuitably affected with the reality of the facts which they record, nor will his affections be warmed as they ought to be by the contemplation of the character which, with the moſt artleſs ſimplicity, they pourtray.

Like the memory, though in a different way, the imagination ſhould be made a ſubſervient faculty; and the early cultivation of it muſt depend upon the tendency which we perceive to the exerciſe of it, and the degree in which it is likely to gain ground among the intellectual faculties. If the conceptions are very lively, and we perceive a tendency to dwell upon them inſtead of the objects of perception, our aim muſt be to invigorate the obſervation, to cultivate the judgment, and, as much as poſſible, to turn the efforts of the imagination into the channel of philoſophical invention. If, on the other hand, as is ſometimes the caſe, either from early neglect of the obſervation, or a want of what may perhaps be properly called phyſical ſenſibility, the conceptions are very dull, and the mind ſeems unable to enter into any thing which cannot be made the object of perception or abſtract reaſoning, it is perhaps deſirable, with caution, to ſtimulate the imagination: and in this view the following remarks of Miſs More appear to us to deſerve the attention of all who are concerned in education.

" I would not however prohibit ſuch works of imagination as ſuit this early period. When moderately uſed, they ſerve to ſtretch the faculties and expand the mind; but I ſhould prefer works of vigorous genius, and pure, unmixed fable, to many of thoſe tame and more affected moral ſtories which are not founded upon Chriſtian principle. I ſhould ſuggeſt the uſe on the one hand of original and acknowledged fictions; and on the other, of accurate and ſimple facts; ſo that truth and fable may ever be kept ſeparate and diſtinct in the mind. There is ſomething that kindles fancy, awakens genius, and excites new ideas in many of the bold fictions of the Eaſt. And there is one peculiar merit in the Arabian and ſome other oriental tales, which is that they exhibit ſtriking, and, in many reſpects, faithful views, of the manners, habits, cuſtoms, and religion of their reſpective countries; ſo that ſome tincture of real local information is acquired by the peruſal of the wildeſt fable, which will not be without its uſes in aiding the future aſſociations of the mind in all that relates to Eaſtern hiſtory and literature."

The imagination ſhould early be employed in what is its peculiar field, invention. We do not of courſe mean, that which has for its object to form combinations with the ſole view of pleaſing the fancy or gratifying the taſte; but that which has in view contrivances to facilitate the purpoſes of life, and the acquiſition of ſcience. We by no means wiſh to be underſtood, that in the early part of education, (and ſtill leſs in the later,) the imagination ſhould never be actively employed on works of fancy and taſte; but in a general way it ſhould be laid down as a principle, that the ſolid and uſeful qualities of the mind ſhould be cultivated firſt, the ornamental as a ſecondary object. The ingenuity and little inventions of children ſhould be encouraged; and where ſufficient ſcope is given for the play of the faculties, and there is no phyſical cauſe to prevent activity of mind, not a day will paſs, even at a very early age, without ſome employment in which the inventive power of the imagination is concerned. The inventions of children generally ariſe, in the firſt inſtance, from neceſſity; but, in their little diverſions, they often diſplay, (of courſe, in a low degree,) the exerciſe of thoſe qualities by which the moſt important combinations and inventions have been effected. As they advance in mental culture, this exerciſe of the imagination ſhould be more and more ſubmitted to the guidance of the judgment. Many of the literary and ſcientific purſuits to which the young are directed, have a tendency to cultivate a philoſophical imagination; and they furniſh numerous opportunities, which a judicious inſtructor will carefully employ, of calling forth and exerciſing its moſt important operations.

Some young perſons, we muſt be contented to allow to paſs through life, ſatisfied if we can make them comprehend the combinations and inventions of others; but it is very ſeldom, where the mind is active and unſhackled, and has been properly ſtimulated and employed by the uſual objects of mental purſuit, that it will reſt here. Either in the manner in which it attains to its concluſions, or in which it tries and applies them, or in the concluſions themſelves, it will leave the track which may have been beaten by others, and ſhew the exerciſe of invention. Novelty ought never to be our object, but truth; but it is pleaſant to ſee any indication of ingenuity; and it ſhould be remembered, that combinations and inventions which are not abſolutely new, may be ſo to the individual.

We ſhall now finiſh this head with a few more remarks from Mr. Stewart, which may ſerve as a reſtraining check upon the irregular or exceſſive exerciſe of the imagination; and may lead the judicious parent to the concluſion with which Miſs Edgeworth ends her chapter on the imagination, that it is a good ſervant but a bad maſter.

" It was undoubtedly the intention of nature, that the objects of perception ſhould produce much ſtronger impreſſions on the mind than its own operations. And, accordingly, they always do ſo, when proper care has been taken in early life, to exerciſe the different principles of our conſtitution. But it is poſſible, by long habits of ſolitary reflection, to reverſe this order of things, and to weaken the attention to ſenſible objects to ſo great a degree, as to leave the conduct almoſt wholly under the influence of imagination. Removed to a diſtance from ſociety, and from the purſuits of life, when we have been long accuſtomed to converſe with our own thoughts, and have found our activity gratified by intellectual exertions, which afford ſcope to all our powers and affections, without expoſing us to the inconveniences reſulting from the buſtle of the world, we are apt to contract an unnatural predilection for meditation, and to loſe all intereſt in external occurrences. In ſuch a ſituation too, the mind gradually loſes that command which education, when properly conducted, gives it over the train of its ideas; till at length the moſt extravagant dreams of imagination acquire as powerful an influence in exciting all its paſſions, as if they were realities.

" When ſuch diſorders of the imagination have been long confirmed by habit, the evil may perhaps be beyond a remedy; but in their inferior degrees, much may be expected from our own efforts; in particular, from mingling gradually in the buſineſs and amuſements of the world; or, if we have ſufficient force of mind for the exertion, from reſolutely plunging into thoſe active and intereſting and hazardous ſcenes, which, by compelling us to attend to external circumſtances, may weaken the impreſſions of imagination and ſtrengthen thoſe produced by realities.

" When a man, under the habitual influence of a warm imagination, is obliged to mingle occaſionally in the ſcenes of real buſineſs, he is perpetually in danger of being miſled by his own enthuſiaſm. What we call good ſenſe in the conduct of life, conſiſts chiefly in that temper of mind which enables its poſſeſſor to view at all times, with perfect coolneſs and accuracy, all the various circumſtances of his ſituation; ſo that each of them may produce its due impreſſion on him, without any exaggeration ariſing from his own peculiar habits. But to a man of an ill-regulated imagination, external circumſtances only ſerve as hints to excite his own thoughts, and the conduct he purſues has, in general, far leſs reference to his real ſituation, than to ſome imaginary one, in which he conceives himſelf to be placed; in conſequence of which, while he appears to himſelf to be acting with the moſt perfect wiſdom and conſiſtency, he may frequently exhibit to others all the appearances of folly."

XIII. In every branch of inſtruction, and in the mode of conveying it, our firſt conſideration ſhould be, its effect upon the underſtanding. The mental habits formed, rather than the number of ideas acquired, ſhould be conſidered as the leading object of attention. We have already intimated, that in a ſubſequent article we ſhall have an opportunity of ſuggeſting ſome obſervations relative to the manner of communicating knowledge, particularly of the ſcientific claſs; and we ſhall conclude our preſent article with ſome remarks which may aſſiſt in the appreciation of the value of the common objects of inſtruction in farthering the cultivation of the intellect, ſuppoſing that the beſt modes of conveying them to the mind have been ſucceſsfully aſcertained. We ſhall not attempt to follow the natural order of them; but ſhall be guided by that which appears moſt ſuitable to our object.

The acquiſition of the *dead languages* forms a leading employment in education; and we truſt it will be long before it ceaſes to be ſo, though we cannot but regret that it ſhould ever be made an excluſive object. Thoſe who know the intimate connection which ſubſiſts between the real command of words, and the nobleſt exerciſes of the underſtanding, will readily allow that the ſtudy of language forms a moſt important auxiliary in intellectual culture. We ſhall have occaſion to ſpecify hereafter to what plans of education the ſtudy of the claſſics ſhould be limited; and this will lead us to enter more at large into the importance of the object. We ſhall content ourſelves therefore, in this place, with ſtating, that the general advantages of this branch of inſtruction are, the cultivation of the habits of patience, of attention, of inveſtigation, of accuracy, of diſcrimination, and of ingenuity; the poſſeſſion of a key to the ideas contained in thoſe languages; greater power in the uſe of our own; and the acquiſition of numerous data for that branch of mental philoſophy which reſpects language.

Geography exerciſes the memory, and were it only for its ſubſerviency to hiſtory, would be highly valuable; but it has other advantages. It may be made the vehicle for various topics of information, and from theſe adjuncts, it acquires a rank in the ſcale of utility, to which, ſeparately conſidered, it would not be entitled. Independently of this, the habit of aſſociating names with things, and of arrangement, which ſeems likely to be formed by learning geography, entitle it to a place in the early part of education.

We uſe the word in its exact though confined ſenſe; and conſidered as comprehending its adjuncts, the ſtudy of it is very important. It leads the mind beyond the narrow ſphere of its own obſervation, enlarges its comprehenſion, and weakens its prejudices; it forms an intereſting link between mere ſenſation and abſtract ſpeculation; it raiſes the mind above the former, and cultivates and ſtores it for the latter. Here, however, it obviouſly borrows its principal utility from what rather comes under the head of civil or natural hiſtory, or of natural and mental philoſophy.

Natural hiſtory, in its various branches, being principally concerned about things, is well adapted for the early ſtage of mental culture. The ſtudy of it forms habits of obſervation, of attaching diſtinct conceptions to words (and conſequently of uſing words correctly), of claſſification, and of attention to objects not connected with ſelf. In all the ſtages of mental culture, theſe ends are anſwered; it gives additional intereſt to ſurrounding objects, and leads us to view them as the works of the great Author of nature. We muſt add here the words of one of our ableſt naturaliſts, in his introduction to his favourite ſcience. "I would recommend botany for its own ſake. I have often alluded to its benefits as a mental exerciſe, nor can any exceed it in raiſing curioſity, gratifying a taſte for beauty and ingenuity of contrivance, or ſharpening the powers of diſcrimination. What, then, can be better adapted for young perſons? The chief uſe of a great part of our education is no other than what I have juſt mentioned. The languages and the mathematics, however valuable in themſelves when acquired, are even more ſo as they train the youthful mind to thought and obſervation. In Sweden, natural hiſtory is the ſtudy of the ſchools by which men riſe to preferment; and there are no people with more acute or better regulated minds than the Swedes."

Mathematical ſcience forms a higher ſtep in the gradation of mental culture. The loweſt branch of it is arithmetic. Learnt merely as an art, it is not without its utility in the culture of the mind. We, however, conſider it as more comprehenſively ſtudied, or rather as *taught* with further views. The commencement of habits of clear perception, of abſtraction, of regularity and correctneſs in practice, of acuteneſs, of uſing definite means in order to obtain definite ends, and of acting upon general rules, may reaſonably be expected from the proper mode of learning this ſcience. It then becomes an introduction to ſcientific inveſtigation; and in this view it is peculiarly valuable, from the exact arrangement of our notation, and the certainty of the reſults of our operations. Algebra poſſeſſes nearly the ſame advantages, and in addition to them, others more important to a higher degree of mental culture. It generates the power of invention and combination, and it accuſtoms the mind to general reaſoning, at the ſame time leaving it the power to check and correct that reaſoning at every ſtep. Geometry forms a habit of clear and cautious reaſoning. It ſerves as a corrective to the wild flights of imagination, and gives proportional vigour to the judgment. The higher branches of mathematical ſcience reſemble, in their effects upon the mind, the one of theſe elementary branches which they moſt reſemble in their mode of inveſtigation. "If there were nothing valuable in the mathematical ſciences for the uſes of human life, yet they are well worth our ſtudy; for by perpetual examples they teach us to conceive with clearneſs, to connect our ideas in a train of dependance, to reaſon with ſtrength and demonſtration, and to diſtinguiſh between truth and falſehood. Something of theſe ſciences ſhould be ſtudied by every one; and that, as Mr. Locke expreſſes it, not ſo much to make us mathematicians, as to make us reaſonable creatures."

Another ſource of the utility of the mathematics, is their ſubſerviency to natural philoſophy. To deſcribe the phenomena of the univerſe, to inveſtigate their cauſes and the connection of theſe cauſes, are the principal objects of this ſcience. To mention theſe objects, is nearly all which is neceſſary to indicate its valuable effects on the mind. The habits of accurate and perſevering obſervation, of inveſtigation, of abſtraction, and of correct reaſoning, are more or leſs produced and cultivated by the ſtudy of the philoſophy of nature. It furniſhes abundant ſcope for the moſt ſublime ſpeculations, and calls forth the nobleſt exerciſes of the imagination, yet reſtrains the mind within the limits of reality. It carries us beyond the boundaries of ſenſe, and leſſens our intereſt in ſelf by increaſing our concern with every thing around us. It enlarges the comprehenſion of the ſoul; for it offers for contemplation the laws of the univerſe. It prepares the ſtudent for an acquaintance with the human mind; for the ſtrictneſs with which its inveſtigations are conducted, prevents that wildneſs of theorizing which is the bane of ſcience, and forms the habit of cautiouſly attending to phenomena, in order to aſcertain the general laws which regulate them. It aids the cauſe of religion; for it accuſtoms the mind to ſeek for the cauſes of obſerved appearances, and leads it from deſign and regularity to infer an intelligent Firſt Cauſe.

Hiſtory produces or cultivates the habit of purſuing with accuracy a ſeries of connected events or phenomena; of tracing cauſes from effects, and of obſerving the operation of cauſes, either ſingly, or in their various combinations. The ſtudent is concerned about realities, and his judgment is corrected; the web he contemplates is not unfrequently intricate, and his penetration is exerciſed in unfolding it. He obſerves the ſlow operation of moral cauſes, and he learns patience as to the reſult of his exertions for the good of others; he ſees the efficacy of minute cauſes operating in conjunction with prediſpoſing circumſtances, and he learns prudence in the direction of thoſe exertions. The enlightened ſtudy of hiſtory prevents the formation, or promotes the eradication of thoſe prejudices which narrow the comprehenſion of the mind. "There is ſcarce any folly or vice," ſays lord Bolingbroke, "more epidemical among the ſons of men, than that ridiculous and hateful vanity, by which the people of each country are apt to prefer themſelves to thoſe of any other, and to make their own cuſtoms, and manners, and opinions, the ſtandard of right and wrong, of true and falſe." This preſents an effectual bar to improvement in the great ſocial concerns of man; and it is apt, perhaps neceſſarily ſo, to be accompanied with contracted views of the qualities of thoſe who differ from us in their religious or political ſentiments. Now what in one caſe deſtroys the illuſion tends to diſſipate it in the other. He who has learnt to view the qualities and actions of other nations as not to be deſpiſed becauſe unlike thoſe of his own, places himſelf out of his little narrow ſphere of ſelf, and gains a comprehenſive habit of thought, which will prevent him from refuſing to admire thoſe qualities and actions, which can ſtand the teſt of reaſon, in bodies of men, or in individuals who differ from him in their modes of thinking. The ſtudy of hiſtory is well adapted to the cure of thoſe prejudices. Accuſtomed to contemplate the hiſtory of other nations, to view them in their mutual dependencies and connections, for a time to make their intereſts our own, we learn to regard the community of which we form a part as itſelf a part of a ſtill greater community, and without becoming indifferent to its welfare and its excellencies, we acquire the power of diſcerning the value of opinions and practices which are of foreign growth.

The ſtudy of compoſition derives its value, partly from facilitating our own practice, and partly from putting it in our power, more fully to feel and to appreciate the beauties of the beſt authors. The practice of compoſition is highly valuable, becauſe it enables us to benefit others by our mental attainments; to judge of the extent and ſolidity of thoſe attainments; to command our knowledge; and to make that knowledge clear and ſubſtantial. Habits of correct compoſition are almoſt neceſſarily productive of preciſion in our ideas, of perſpicuity in our reaſonings; they prevent their poſſeſſors from reſting ſatisfied with ſuperficial notions; and they force them to think cloſely.

The higheſt ſcientific object to which the young can be directed, and what indeed ſhould form the laſt art of education, is mental philoſophy, or the philoſophy of the human mind, that ſcience which teaches us the laws of our mental frame, which ſhews us the origin of our various modes and habits of thought and feeling, how they operate upon one another, and how they are cultivated or repreſſed. The well directed ſtudy of it calls into action and improves the higheſt intellectual faculties; and while it employs the powers of the mind, it ſuggeſts the beſt means for their culture, and the beſt mode of their direction. It enables us to trace the intricacies of our own hearts, and points out the proper diſcipline for their correction. It diſcovers to us the real excellencies of the mind, and guides us in our efforts for the attainment of them. To ſucceſs in forming the moral and mental character of others, it is more or leſs eſſential; for it diſcloſes the nature of our influence over their minds, and the beſt mode of exerciſing it ſo as to bring their various faculties into the beſt adjuſted and moſt perfect ſtate. Purſued with proper views, and in a proper manner, it lays the beſt foundation for the higheſt degrees of intellectual, moral, and religious improvement. "There are difficulties," to uſe the words of the great Hartley, "both in the word of God, and in his works; and theſe difficulties are ſometimes ſo magnified, as to lead to ſcepticiſm, infidelity, or atheiſm. Now the contemplation of our own frame and conſtitution, appears to me to have a peculiar tendency to leſſen theſe difficulties attending natural and revealed religion, and to improve their evidences, as well as to concur with them in their determination of man's duty and expectations."

The beſt ground-work for the purſuit of mental ſcience is, an accurate judgment, a diſcriminating, penetrating intellect, and a habit of correct and cautious reaſoning; and therefore the beſt preparatory culture of mind is the ſtudy of the various branches of the mathematics and of natural philoſophy. But habits of reflection, and good ſenſe, are all which is eſſential to the beneficial purſuit of mental ſcience; and with theſe, it will in all caſes lead to reſults highly important to individual welfare and uſefulneſs. The young in particular will be led, by an acquaintance with the practical laws of the mind, to perceive how their preſent conduct affects their future character and happineſs; to perceive the importance of avoiding a frivolous employment of their time without any end beyond mere amuſement; to perceive the impoſſibility of indulging in vicious gratifications without leſſening their means of happineſs, and checking their progreſs towards excellence. They will learn how habits are formed, almoſt imperceptibly, and, when long exerciſed, how exceedingly difficult it is to eradicate them; they will learn to conſider the formation of habits, as requiring, therefore, their utmoſt circumſpection. They will be enabled to diſcern what habits of thought and feeling are baneful, what uſeful; what means of happineſs ſhould be regarded as of primary value, what ſhould be regarded as ſecondary only. In ſhort, there can be no heſitation in affirming, that, next to the immediate purſuits of religion, to which the laws of the mind direct, a judicious acquaintance with thoſe laws is the moſt important means for the right employment of that period of life on which the happineſs of our exiſtence in a great meaſure depends.

INTELLECTUAL *Thinking.* See THINKING.

INTELLIGIBLE, any thing capable of being underſtood, or conceived, by the mind.

Philoſophers have invented certain beings which are purely intelligible, and only ſubſiſt in the underſtanding: ſuch are the *entia rationis*, univerſal ideas, and other chimeras.

The intelligible, or intellectual world, is the idea of the world in the divine mind, frequently ſpoken of by Malebranche.

INTEMPERIES, in the *Galenical* and *Humoral Pathology*, the ſame with *dyſcraſy*, δυσκρασια, and the oppoſite of *temperament*, or κρασις, *craſis*. As health was ſuppoſed to conſiſt in the proper temperament, or proportion of the four qualities of hot and cold, dry and moiſt; ſo the *intemperies*, or diſproportionate prevalence of any one or two of theſe qualities, or of the four humours, in which they were ſuppoſed to be particularly inherent, was deemed the origin of all diſeaſes: and according to the ſuppoſed predominance of this or that quality or humour, each morbid intemperies received its name. Thus when heat or bile prevailed, it was called *intemperies calida*, or biliosa; when cold and phlegm, *intemperies frigida*, and pituitoſa; and ſo on. (See Sennert. Inſtit. Medicinæ, lib. ii. cap. 3.) See Humoral *Pathology*, and Galen.

INTENDANT, one who has the conduct, inſpection, and management of any thing.

This is a title frequent among the French: they have intendants *of the marine*, who are officers in the ſea-ports, whoſe buſineſs is to take care the ordinances and regulations relating to ſea-affairs be obſerved; intendants *of the finances*, who have the direction of the revenues; intendants *of provinces*, who are appointed by the king to take care of the adminiſtration of juſtice, policy, and finances, in the provinces; alſo, intendants *of buildings*, *of houſes*, &c.

INTENDMENT *of Law*, the ſenſe, intention, or true meaning of the law.

The judges ought to judge according to the common intendment of the law.

Intendment *of Crimes*. In caſes of treaſon, intention proved by circumſtances is puniſhable as if it were put in execution. So likewiſe, if a perſon enter the houſe in the night-time, with intent to commit burglary, it is felony: and an aſſault on the high-way, with an intent to commit burglary, is felony, and puniſhed with tranſportation, 23 Car. II. c. 1. 7 Geo. II. c. 21.

INTENSIO, *Lat.* Intenso, *Ital. Intenſe*, in *Muſic*. Intenſe ſounds are ſuch as are produced with the greateſt force, which are loudeſt, and heard at the greateſt diſtance. They are ſuch ſounds likewiſe, as are produced from ſtrings of greateſt tenſion, and which, on that account, vibrate more powerfully.

INTENSION is a term frequently uſed by the Greek and other ancient writers on muſic: intenſions of the gravitas, were the major harmonics of the aſcent, in the deſcending major ſcale of the gravitas, according to M. Overend's Manuſcripts in the library of the Royal Inſtitution, vol. vi. p. 7. alſo, vol. ii. p. 213. in which volumes much information on this curious, but almoſt obſolete ſubject, will be found.

INTENSIONE, in *Law*, a writ which lies againſt him who enters after the death of the tenant in dower, or tenant for life, and holds out him in the reverſion, or remainder.

Intensione, *Ital.* as *prima intenſione*, in *Muſic*, as well as painting, implies a *ſketch*, a ſubject, a firſt deſign.

INTENSUM Diatonum. See Diatonic and Genus.

INTENT, in *Civil Law*, ſignifies to begin or commence an action, or proceſs.

INTENTION, or Intension, in *Medicine*, that judgment or method of cure, which a phyſician forms to himſelf from a due examination of the ſymptoms.

Intention, in *Phyſics*, the increaſe of the power, or energy, of any quality; as heat, cold, &c.

By which it ſtands oppoſed to *remiſſion*; which ſignifies its decreaſe, or diminution.

Intention, in *Metaphyſics*, denotes an exertion of the intellectual faculties with more than ordinary vigour; when the mind with earneſtneſs fixes its view on any idea, conſiders it on all ſides, and will not be called off by any ſolicitation.

The ſchoolmen alſo ſpeak of terms of firſt and ſecond intention.

Intention, *a Term of Firſt*, is that which ſignifies a thing; the primary deſign of men, in eſtabliſhing words, being to expreſs things, or the ideas they have of things.

Intention, *a Term of Second*, is that which does not ſignify a thing, but another term, or ſign.

Thus, a tree, a man, &c. are terms of *firſt* intention; and the terms in rhetoric, grammar, &c. as figure, kind, &c. are terms of *ſecond* intention.

Intention, *Intentio*, επιτασις, in the *Ancient Muſic*, was uſed to denote the paſſage of the voice from grave to acute.

INTENTIONAL Qualities. See Qualities.

INTER *Canem et Lupum*, in *Law*, words uſed formerly in appeals, to ſignify that a crime was committed in the twilight, i. e. *inter diem et noctem*, &c. This part of a day has divers other denominations: thus, in ſome parts of England, they call it *mock-ſhadow*, corruptly *muck-ſhade*: and, in the north, *day-light's gate*; others ſay, *betwixt hawk and buzzard*.

INTERAMNA, or Interamnium, (*Teramo*,) in *Ancient Geography*, a town of Italy, ſituated in Latium, very near Campania, on the river Nar, which, from its ſource to its mouth, ſerved as a boundary between the countries of the Sabines and Umbrians.

INTERCALARY Day, denotes the odd day inſerted in the leap year. See Bissextile.

The word is derived from the Latin *intercalaris*, of *calo*, *calare*, which anciently ſignified, *to call with a loud voice*: an intercalary day, among the Romans, ſignifying a day inſerted between two other days; which, for that reaſon, was proclaimed by the prieſts with a loud voice.

INTERCALATION. See Interpolation.

INTERCAPSULARIA, in *Anatomy*, a name given by ſome writers to the cavities between the ſcapulæ and the vertebræ.

INTERCEPTED Axis, in *Conic Sections*, is the ſame with what is otherwiſe called the *abſciſſa*.

INTERCESSION, Intercessio, was uſed in *Ancient Rome*, for the act of a tribune of the people, or other magiſtrate, by which he inhibited the acts of other magiſtrates; or, even, in caſe of the tribunes, the decrees of the ſenate. *Veto* was the ſolemn word uſed by the tribunes when they inhibited any decree of the ſenate, or law propoſed to the people. The general law of theſe interceſſions was, that any magiſtrate might inhibit the acts of his equal, or inferior; but the tribunes had the ſole prerogative of controlling the acts of every other magiſtrate, yet could not be controlled themſelves by any.

INTERCESSOR, from *inter* and *cedo*, *I go between*, a perſon who prays, expoſtulates, or intercedes, in behalf of another.

In the Roman law, interceſſor was the name of an officer, whom the governors of provinces appointed principally to raiſe taxes, and other duties.

Intercessor is alſo a term heretofore applied to ſuch biſhops as, during the vacancy of a ſee, adminiſtered the biſhopric, till a ſucceſſor to the deceaſed biſhop had been elected. See Bishop.

The third council of Carthage calls theſe *interventors*.

INTERCIDENT Pulse, a term uſed by medical writers to expreſs a ſort of pulſe, in which between two regular ſtrokes there is perceived a third irregular.

INTERCOLUMNIATION, or Intercolumnation, in *Architecture,* ſignifies the ſpace between two columns. See the plan of *Baſilic,* in *Plate Architecture.*

Vitruvius calls it *intercolumnium;* which, according to that author, is of five kinds: viz. *picnoſtyle,* A, one diameter and a half; *ſiſtyle,* B, two diameters; *euſtyle,* C, two and a quarter diameters, which is the moſt graceful; *diaſtyle,* D, three diameters; and *aræoſtyle,* E, four diameters; which ſee explained under their proper heads, Picnostyle, &c. The intercolumniation, or ſpace between the columns to the arcade F, is ſeven and a half diameters; and the intercolumniation wherein there is a ſpace, G, of only one half a diameter, is called coupling columns, an invention aſcribed to the moderns.

From a medium, ſome authors have laid down the following proportions; in the Tuſcan order, the intercolumniation, is to be four diameters of the body of the column below; in the Doric, three; in the Ionic, two; in the Corinthian, two one quarter; and in the Compoſite, one and a half.

INTERCOMMONING is when the commons of two manors lie together, and the inhabitants of both have, time out of mind, cauſed their cattle to feed promiſcuouſly in each.

INTERCOSTALES, in *Anatomy,* the muſcles which fill the intervals of the ribs, and are arranged in two ſtrata, diſtinguiſhed by the epithets of *external* and *internal.* This region of the body includes alſo the levatores coſtarum and triangularis ſterni.

The intercoſtal muſcles (intercoſtiens) conſiſt of two thin muſcular planes in each of the intercoſtal intervals, having their fibres diſpoſed obliquely, and attached to the margins of the ribs, which bound theſe ſpaces.

The *external intercoſtal* muſcles are attached by their upper edges to the outer border of the lower margins of the ribs, by means of tendinous and fleſhy fibres. Their fibres are directed obliquely downwards and forwards; and they are attached below by an inſertion exactly reſembling the former to the upper edge of the ſucceeding rib. Various blood-veſſels and nerves penetrate them in different parts of the trunk. Their origin begins at that part of the rib which is articulated to the tranſverſe proceſs of the vertebra, and is continued towards the front as far as the junction of the bone with the cartilage: beyond this point the intervals of the cartilages are filled with their aponeurotic fibres, which have ſimilar attachments and direction to the external intercoſtal muſcles.

As the fibres of theſe external intercoſtal muſcles paſs from above obliquely downwards and forwards, they form towards the front acute angles with the upper and obtuſe angles with the lower ribs. The poſterior fibres are more oblique than the anterior. The ſtratum placed under the firſt rib, between it and the ſecond, is called the firſt intercoſtal muſcle; and thoſe of the following intervals, according to the order in which they ſucceed, the ſecond, third, &c. to the eleventh.

The external intercoſtal muſcles are covered on their outer ſurfaces by moſt of the broad muſcles of the trunk, as the two pectorals, obliquus externus abdominis, ſerratus anticus, and the ſerrati poſtici; and in ſome degree behind by the ſacrolumbalis and longiſſimus dorſi. They correſpond on the internal ſurface to the internal intercoſtals, from which they are partly ſeparated by the intercoſtal veſſels and nerves. Near the vertebral column they are covered by the pleura.

The *internal intercoſtal* muſcles exactly reſemble the former in ſituation, attachments, and number. They commence behind at the angles of the ribs, and extend in front to the ends of the cartilages. They are attached to the inner borders of the edges of the ribs; and their fibres proceed in an oblique courſe from above downwards and backwards, ſo as to decuſſate thoſe of the external ſtratum. They form thinner ſtrata than the external intercoſtals, are more tendinous, have their fibres leſs oblique and conſequently rather ſhorter. Sometimes a faſciculus of one or two of the internal intercoſtals paſſes over one rib to be fixed into the ſecond. Theſe are very irregular in number, ſize, and ſituation, and do not require a ſeparate deſcription: they have however been noticed as diſtinct muſcles by the name of *ſubcoſtales.*

As the external intercoſtals only reach to the ends of the bony portions of the ribs, and the internal do not extend beyond the angles, a ſmall part of the intercoſtal intervals in front and behind is filled only by a ſingle ſtratum of fibres; but the remaining and largeſt part is cloſed by two layers.

The internal intercoſtal muſcles are covered by the external, from which they are partly ſeparated by the veſſels and nerves of the ſame name. Where the former end in front, the latter are covered by the thin aponeuroſis already deſcribed. They are lined on the inſide by the pleura.

The *levatores coſtarum* (les tranſverſo-coſtiens) are ſmall, thin, and flat faſciculi of a radiated form, placed behind the external intercoſtals, from which they are very diſtinct. They are twelve in number, as each rib has one. Each of theſe muſcles has an aponeurotic origin from the apex of the tranſverſe proceſs of the correſponding dorſal vertebra, or from the ligament connecting the rib to that proceſs; its fibres paſs obliquely downwards and forwards, and, growing broader, are attached to the upper edge of the rib immediately below. The levator of the firſt rib ariſes from the tranſverſe proceſs of the ſeventh cervical vertebra, that of the ſecond from the correſponding proceſs of the firſt dorſal vertebra, and ſo on to the twelfth. They increaſe in ſize regularly from above downwards.

Beſides theſe, each of the two, three, or four lower ribs has a longer faſciculus, ariſing from the tranſverſe proceſs of the ſecond vertebra above it. Theſe are called levatores longiores, to diſtinguiſh them from the former, which are named breviores. They have thin tendinous origins from the tranſverſe proceſſes, paſs over the ribs immediately below theſe proceſſes, and are inſerted into the upper borders of the ſucceeding ribs: thus the firſt levator longior, ariſing from the tranſverſe proceſs of the ſeventh dorſal vertebra, is fixed to the ninth rib.

Theſe muſcles are placed between the external intercoſtals and the ſacrolumbalis and longiſſimus dorſi.

The *triangularis ſterni* (ſterno-coſtalis, ſterno-coſtien) is a very thin flattened ſtratum, of a triangular figure, placed behind the cartilages of the ribs. It is fixed to the poſterior part of the edges of the enſiform cartilage, and of the ſecond bone of the ſternum, as high as the cartilage of the fourth rib, by aponeurotic fibres, which cover a conſiderable portion of the muſcle. The fleſhy fibres, directed outwards and upwards, and more oblique as they are nearer to the upper part, form at firſt a continuous broad layer, and then divide into ſeparate portions attached by thin aponeuroſes to the third, fourth, fifth, and ſixth ribs. It is continuous below with the tranſverſus abdominis; correſponds in front to the cartilages of the four laſt true ribs, to the internal intercoſtal muſcles, and to the mammary veſſels; and behind to the pleura, and for a ſmall ſpace to the diaphragm.

The motions produced by the muſcles in this region are the elevation and depreſſion of the ribs, which coincide with inſpiration and exſpiration. The agents of elevation are the levatores and intercoſtal muſcles, beſides other auxiliary powers. The former, fixed to the tranſverſe proceſſes, which are immoveable, can obviouſly exert their action only on the ribs, which they elevate and carry outwards. Thus they increaſe the tranſverſe diameter of the cheſt, particularly at its lower part, where, on one hand, the muſcles are much ſtronger, and on the other, in conſequence of the greater mobility of the lower ribs, the reſiſtance to be overcome is much leſs. The action of the intercoſtals in elevating the ribs is much favoured by the mode of attachment of the firſt and ſecond of theſe bones. They poſſeſs but little power of motion, and therefore form a fixed point, to which the others can be elevated. They are moreover ſtill further fixed, particularly in deep inſpirations, by the ſcaleni, which may carry them in a ſlight degree upwards. Both ſtrata, although the directions of their fibres are ſo different, act equally as elevators: in fact, as the upper part of the cheſt is fixed, the lower portion muſt be moved by theſe powers. In great inſpirations, other muſcles attached to the cheſt, as the pectorales, ſerrati, &c. aſſiſt the levatores and intercoſtal muſcles in elevating and turning outwards the ribs.

The depreſſion of the ribs, or their reſtoration from the elevated to their former ſtate, is nearly a paſſive motion: it depends, in the firſt place, on the relaxation of the elevating powers, and then on the elaſticity of the cartilages connected to the ſternum. Theſe are twiſted in the act of elevation, and immediately recover themſelves when this force ceaſes to act. When the depreſſion is more conſiderable, as in coughing, in difficult expectorations, in ſneezing, caſes in which a ſtrong exſpiration is required for the purpoſe of expelling much air from the cheſt, an active power is exerted for drawing down the ribs. The triangularis ſterni, which has its fixed point in the ſternum, depreſſes the cartilages of the true ribs. The abdominal muſcles fix below the looſe edges of the falſe ribs, which thus become a fixed point to which the other ribs may be depreſſed by the intercoſtal muſcles. Thus the latter muſcles are elevators or depreſſors, according as the fixed point is above or below. Moreover, the quadratus lumborum holds down firmly the laſt rib; and bears the ſame relation to that bone in great exſpirations, which the ſcaleni do to the two firſt ribs in deep inſpirations. The ſerratus inferior poſticus aſſiſts the abdominal muſcles on theſe occaſions.

The intercoſtal muſcles and the diaphragm ſeem to form an exception to that general law of the voluntary muſcles, by virtue of which, any muſcle after long exerciſe goes into a ſtate of fatigue, requiring for the reparation of its power an intermiſſion of action, which may be particularly obſerved in ſleep. Now the motions of the cheſt, beginning and ending with life, are never interrupted. This exception is only apparent; each contraction is ſucceeded by a proportionate relaxation, ſo that the time of inactivity of the pectoral muſcles equals that of their active ſtate. Moreover, the diaphragm and intercoſtals mutually ſupply each other's places; both are ſaid to be employed in inſpiration, but ſometimes one and ſometimes the others are more actively concerned; ſo that we may conſider them in ſome degree as alternately acting and reſting. The intercoſtals appear to be the moſt concerned during ſleep, and the diaphragm in the waking ſtate. Indeed a conſiderable contraction of the latter, in ſome meaſure, oppoſes that of the lower intercoſtals, ſince it tends to contract the lower circumference of the cheſt which the others enlarge. The two ſtrata of the intercoſtals may contract ſeparately; thus one may reſt while the other is employed. Laſtly, the levatores may alternate with the latter muſcles: thus, although the motions of the cheſt are conſtant, their agents, like all the other muſcles of the animal life, may be ſubjected to the law of intermiſſion of action. Hence, if reſpiration is conſiderably hurried, and all the inſpiratory muſcles are brought into action, they are affected with a real laſſitude, and at laſt cannot contract without difficulty. In running, where the blood is carried in great abundance to the heart, and muſt paſs quickly through the cheſt, we ſoon loſe breath; which is merely experiencing a difficulty in contracting the tired muſcles of inſpiration. Reſpiration is then interrupted, as locomotion would be by a fatigued ſtate of the muſcles of the lower extremities; and this may even go ſo far as to produce a real immobility of the inſpiratory muſcles, a ſtate, which though not dangerous in other inſtances, as in the organs of locomotion for example, is fatal in the reſpiratory muſcles as it ſuſpends breathing. Examples of animals, and even of men falling ſuddenly dead after great exertions in running, are not extremely rare. Death occurs in theſe inſtances, as when the phrenic nerve or the ſpinal marrow is divided. Thoſe affections of the cheſt, in which reſpiration is hurried for a certain time, occaſion at laſt a real laſſitude of the pectoral muſcles; and the difficulty of breathing produced by this tired ſtate of the moving organs, ſucceeding to that produced by the diſeaſe itſelf, prolongs the painful ſenſation of ſuffocation. We muſt diſtinguiſh, in theſe caſes, what belongs to the lung, from that which ariſes from the muſcles. After certain hyſterical attacks, in which the diaphragm and intercoſtal muſcles have been violently agitated, a real ſenſe of fatigue is experienced in the cheſt, which can only be moved with difficulty, and not to a ſufficient extent for the production of loud ſounds, a phenomenon which may be obſerved alſo after exertion in running. The muſcles require reſt before they can expel air in a quantity capable of producing ſtrong and diſtinct ſounds.

INTERCOSTALES *Arteriæ*, arteries which run in the intervals of the ribs: the intercoſtales venæ are veins correſponding to thoſe. See ARTERY and VEIN.

INTERCOSTALES *Nervi*, are the branches of the ſpinal marrow in the back, which accompany theſe arteries and veins. The epithet *intercoſtales* is ſometimes alſo applied to the great ſympathetic nerve. See NERVE.

INTERCUS, a word uſed by ſome medical writers, to expreſs that ſort of dropſy more uſually called an *anaſarca*.

INTERDICT, a cenſure inflicted by a pope, or biſhop, ſuſpending the prieſts from their functions, and depriving the people of the uſe of ſacraments, divine ſervice, and Chriſtian burial.

In common law, interdict is alſo uſed in the ſame ſenſe as in the canon law; where it is defined to be, "cenſura eccleſiaſtica prohibens adminiſtrationem divinorum."

INTERDICT is moſt properly underſtood of a general excommunication of a country, or city, as appears by the Decretals. See EXCOMMUNICATION.

There is a *local* and a *perſonal* interdict: where theſe two are joined, the interdict is ſaid to be *mixed*.

This puniſhment, as well as general excommunications, were but little known till the time of pope Gregory VII. In the year 1169, pope Alexander III. put all England under an interdict, forbidding the clergy to perform any part of divine ſervice, except the baptizing of infants, taking confeſſion, and giving abſolution to dying penitents.

In excommunicating a prince, all his adherents, that is, his ſubjects who retain their allegiance, are excommunicated, and the whole country is put under an interdict. In the reign of king John, the kingdom of England lay under a papal interdict, for above ſix years together: it began A. D. 1208.

In imitation of the popes, the biſhops alſo ſoon began to interdict; and it became a common thing for a city, or town, to be excommunicated for the ſake of a ſingle perſon whom they undertook to ſhelter; but this ſeverity was found to have ſuch ill effects, that they have been obliged to moderate it.

An interdict is denounced, and taken off again, with the ſame formalities as an excommunication.

INTERDICTS, in the *Roman Law*, certain formulæ of words by which the prætor, when the poſſeſſion of any thing was conteſted between many, ordered or forbade ſomething to be done with it, till the right or property ſhould be legally determined.

Which formulæ were called interdicts, becauſe they related to the poſſeſſion of the thing in the interim, or till the right was aſcertained.

They had three kinds of interdicts, *prohibitory*, *reſtitutory*, and *exhibitory*. *Prohibitory*, were thoſe by which the judges forbade any one to vex another in the poſſeſſion of any thing legally belonging to him. *Reſtitutory* were thoſe by which the judges appointed any one, who had been expelled out of his eſtate to be repoſſeſſed, before his right was legally aſcertained; and this was the ſame with what they called the *reintegrant*. *Exhibitory* were thoſe by which any thing in diſpute was ordered to be exhibited; as a teſtament, &c.

There was alſo a ſecond diviſion of interdicts; *viz.* into *adipiſcendæ*, *retinendæ*, and *recuperandæ:* the firſt tending to the acquiring a new poſſeſſion, as the *interdict quorum bonorum*, &c., the ſecond to the keeping an old one till it was farther determined, as the *uti poſſidetis*, &c., the laſt to the recovering one loſt, as *unde vi*, &c.

INTERDICTION *of Water and Fire*, a ſentence anciently pronounced againſt ſuch as, for ſome crime, were to be baniſhed.

They were not directly adjudged to baniſhment; but by giving order, that nobody ſhould receive them, but deny them *fire and water*, they were condemned, as it were, to a civil death: and this they called *legitimum exilium*. Livy. See EXILE.

INTEREST, a ſum of money reckoned for the loan and forbearance of ſome other ſum, lent for, or due at, a certain time, according to ſome certain rate.

The ſum lent, or forborn, is called the *principal*, becauſe it is the ſum that procreates the intereſt, or from which the intereſt is reckoned.

Intereſt is either *ſimple* or *compound.*

INTEREST, *ſimple*, is that counted from the principal only.

Let p repreſent the principal, n the number of years or parts of a year, r the intereſt of 1*l.* for a year, and m the amount of the principal p for the time n at the rate r; and ſince the amount of 1*l.* for one year is $1 + r$, the amount of 1*l.* for n years, muſt be $1 + nr$; the intereſt of the principal p at the rate r in n years muſt be pnr; and $1l. : 1 + nr :: p : p + pnr = m$ the amount: from this general theorem we can eaſily deduce problems for reſolving all the caſes that occur in ſimple intereſt.

Prob. 1.—Having any principal ſum, and time, and rate of intereſt given, to find the amount: as $m = p + pnr = p \times \overline{1 + nr}$; we ſhall have this rule: multiply the intereſt of 1*l.* for a year by the given number of years. Add unity to the product and multiply the ſum by the given principal: this ſecond product will be the amount required. *E. g.* what ſum will 567*l.* 10*s.* amount to in nine years at 5 *per cent. per annum?* Here $p = 567.5$, $n = 9$, and $r = .05$; therefore $m = p \times \overline{1 + nr} = 567.5 \times \overline{1 + .45} = 822.875 =$ 822*l.* 17*s.* 6*d.* Or if it were required to find the amount of one penny at 5 *per cent.* ſimple intereſt in 1780 years; $p =$ 1*d.*, $n = 1780$, and $r = .05$, therefore $m = 1 \times \overline{1 + 89} = 90$ *d.* = 7*s.* 6*d.*

If the time given does not conſiſt of whole years the fractional part may be eaſily reduced to decimal parts of a year.

Prob. 2.—Having the amount of any principal at a given rate in a given time, to find the principal; it appears, from the theorem, $m = p \times \overline{1 + nr}$, that $p = \frac{m}{1 + nr}$; *i. e.* divide the amount by the product of the time and intereſt of 1*l.* for a year with unity added to it. *E. g.* what principal will amount to 822*l.* 17*s.* 6*d.* in nine years at 5 *per cent. per annum?* Here $m =$ 822*l.* 17*s.* 6*d.* or 822.875, and n, r as before: therefore $\frac{m}{1 + nr} = \frac{822.875}{1 + .45} = 567.5$, or 567*l.* 10*s.*

Prob. 3.—Having the amount of a given principal at a given rate, to find the number of years. From the theorem we eaſily deduce, by tranſpoſition and diviſion, $n = \frac{m - p}{pr}$, *viz.* ſubtract the principal from the amount, and divide the remainder by the product of the principal and intereſt of 1*l.* for a year. *E. g.* in what time will 567*l.* 10*s.* amount to 822*l.* 17*s.* 6*d.* at 5 *per cent. per annum?* $n = \frac{m - p}{pr} = \frac{822.875 - 567.5}{28.375} = \frac{255.375}{28.375} = 9$.

Prob. 4.—Having the amount of a given principal in a given time, to find the rate, and conſequently the intereſt *per cent.* From the theorem we eaſily derive $r = \frac{m - p}{pn}$; *i. e.* ſubtract the principal from the amount, and divide by the product of the principal into the number of years; *e. g.* at what rate *per cent.* will 567*l.* 10*s.* amount to 822*l.* 17*s.* 6*d.* in nine years? Here $\frac{m - p}{pn} = \frac{822.875 - 567.5}{5107.5} = \frac{255.375}{5107.5} = .05$: and, therefore, the intereſt is 5 *per cent.*

Prob. 5.—The annual intereſt of any principal p at the rate r, is pr; *i. e.* multiply the principal by the intereſt of 1*l.* for a year, *e. g.* the intereſt of 75*l.* for one year at 3 *per cent.* is $75 \times .03 = 2.25 =$ 2*l.* 5*s.* The intereſt of 157*l.* 17*s.* 6*d.* at 5 *per cent.* is 157.875 (reducing the 17*s.* 6*d.* to decimals of a pound) $\times .05 = 7.89375 =$ 7*l.* 17*s.* 10½*d.* The intereſt of any principal p at the rate r for n years, is prn; obtained by multiplying the principal, rate, and number of years.

The daily intereſt is found by dividing the annual intereſt by 365; thus .05, being the intereſt of one pound for one year at 5 *per cent.*, divided by 365, the quotient will be .0001369, &c. which is the intereſt of one pound for one day at the ſame rate. And $\frac{.03}{365} = .0000821$ is the intereſt of one pound for one day, at 3 *per cent. per annum.* The intereſt for one day, at any rate, being thus found, that intereſt multiplied by 2, 3, 4, 5, 6, &c. gives the intereſt of one pound for any number of days; and thus the following table of ſimple intereſt for any number of days is eaſily made.

INTEREST.

A TABLE

Of Simple Intereſt.—The Intereſt of One Pound for any Number of Days, &c.

Days.	3 per cent.	3½ per cent.	4 per cent.	4½ per cent.	5 per cent.	Days.
1	.0000,821	.0000,958	.0001,095	.0001,232	.0001,369	1
2	.0001,641	.0001,916	.0002,191	.0002,465	.0002,739	2
3	.0002,465	.0002,876	.0003,287	.0003,698	.0004,109	3
4	.0003,287	.0003,835	.0004,383	.0004,931	.0005,479	4
5	.0004,109	.0004,794	.0005,479	.0006,164	.0006,849	5
6	.0004,931	.0005,753	.0006,575	.0007,397	.0008,219	6
7	.0005,753	.0006,712	.0007,671	.0008,630	.0009,589	7
8	.0006,575	.0007,671	.0008,767	.0009,863	.0010,958	8
9	.0007,397	.0008,630	.0009,863	.0011,095	.0012,328	9
10	.0008,219	.0009,589	.0010,958	.0012,328	.0013,698	10
11	.0009,041	.0010,547	.0012,054	.0013,561	.0015,068	11
12	.0009,863	.0011,506	.0013,150	.0014,794	.0016,438	12
13	.0010,684	.0012,465	.0014,246	.0016,027	.0017,808	13
14	.0011,506	.0013,424	.0015,342	.0017,260	.0019,178	14
15	.0012,328	.0014,383	.0016,438	.0018,493	.0020,547	15
16	.0013,150	.0015,342	.0017,530	.0019,726	.0021,917	16
17	.0013,972	.0016,301	.0018,630	.0020,958	.0023,287	17
18	.0014,794	.0017,260	.0019,726	.0022,191	.0024,657	18
19	.0015,616	.0018,219	.0020,821	.0023,424	.0026,027	19
20	.0016,438	.0019,178	.0021,917	.0024,657	.0027,397	20
21	.0017,260	.0020,137	.0023,013	.0025,890	.0028,767	21
22	.0018,082	.0021,095	.0024,109	.0027,123	.0030,137	22
23	.0018,904	.0022,054	.0025,205	.0028,356	.0031,806	23
24	.0019,726	.0023,013	.0026,301	.0029,580	.0032,876	24
25	.0020,547	.0023,972	.0027,397	.0030,821	.0034,246	25
26	.0021,369	.0024,931	.0028,493	.0032,054	.0035,616	26
27	.0022,191	.0025,890	.0029,589	.0033,287	.0036,986	27
28	.0023,013	.0026,849	.0030,684	.0034,520	.0038,556	28
29	.0023,835	.0027,808	.0031,780	.0035,753	.0039,726	29
30	.0024,657	.0028,767	.0032,876	.0036,986	.0041,095	30
31	.0025,479	.0029,726	.0033,972	.0038,219	.0042,465	31
32	.0026,301	.0030,684	.0035,068	.0039,452	.0043,835	32
33	.0027,123	.0031,643	.0036,164	.0040,684	.0045,205	33
34	.0027,945	.0032,602	.0037,260	.0041,917	.0046,575	34
35	.0028,767	.0033,561	.0038,356	.0043,150	.0047,945	35
36	.0029,589	.0034,520	.0039,452	.0044,383	.0049,315	36
37	.0030,411	.0035,479	.0040,547	.0045,616	.0050,684	37
38	.0031,232	.0036,438	.0041,643	.0046,849	.0052,054	38
39	.0032,054	.0037,397	.0042,739	.0048,082	.0053,424	39
40	.0032,876	.0038,356	.0043,835	.0049,315	.0054,794	40
41	.0033,698	.0039,315	.0044,931	.0050,547	.0056,164	41
42	.0034,520	.0040,274	.0046,027	.0051,780	.0057,534	42
43	.0035,342	.0041,232	.0047,123	.0053,013	.0058,904	43
44	.0036,164	.0042,191	.0048,219	.0054,246	.0060,274	44
45	.0036,986	.0043,150	.0049,315	.0055,479	.0061,643	45
46	.0037,808	.0044,109	.0050,411	.0056,712	.0063,013	46
47	.0038,630	.0045,068	.0051,506	.0057,945	.0064,383	47
48	.0039,452	.0046,027	.0052,602	.0059,178	.0065,753	48
49	.0040,274	.0046,986	.0053,698	.0060,411	.0067,123	49
50	.0041,095	.0047,945	.0054,794	.0061,643	.0068,493	50
51	.0041,917	.0048,904	.0055,890	.0062,876	.0069,863	51
52	.0042,739	.0049,863	.0056,986	.0064,109	.0071,232	52
53	.0043,561	.0050,821	.0058,082	.0065,342	.0072,602	53
54	.0044,383	.0051,780	.0059,178	.0066,575	.0073,972	54
55	.0045,205	.0052,739	.0060,274	.0067,808	.0075,342	55
56	.0046,027	.0053,698	.0061,369	.0069,041	.0076,712	56
57	.0046,849	.0054,657	.0062,465	.0070,274	.0078,082	57
58	.0047,671	.0055,616	.0063,561	.0071,506	.0079,452	58
59	.0048,493	.0056,575	.0064,657	.0072,739	.0080,821	59
60	.0049,315	.0057,534	.0065,753	.0073,972	.0082,191	60
61	.0050,137	.0058,493	.0066,849	.0075,205	.0083,561	61
62	.0050,958	.0059,452	.0067,945	.0076,438	.0084,931	62
63	.0051,780	.0060,411	.0069,041	.0077,671	.0086,301	63
64	.0052,602	.0061,369	.0070,137	.0078,904	.0087,671	64
65	.0053,424	.0062,328	.0071,232	.0080,137	.0089,041	65
66	.0054,246	.0063,287	.0072,328	.0081,369	.0090,411	66
67	.0055,068	.0064,246	.0073,424	.0082,602	.0091,780	67
68	.0055,890	.0065,205	.0074,520	.0083,835	.0093,150	68
69	.0056,712	.0066,164	.0075,616	.0085,068	.0094,520	69
70	.0057,534	.0067,123	.0076,712	.0086,301	.0095,890	70
71	.0058,356	.0068,082	.0077,808	.0087,534	.0097,260	71
72	.0059,178	.0069,041	.0078,904	.0088,767	.0098,630	72
73	.0060,000	.0070,000	.0080,000	.0090,000	.0100,000	73
74	.0060,821	.0070,958	.0081,095	.0091,232	.0101,369	74
75	.0061,643	.0071,917	.0082,191	.0092,465	.0102,739	75
76	.0062,465	.0072,876	.0083,287	.0093,698	.0104,109	76
77	.0063,287	.0073,835	.0084,383	.0094,931	.0105,479	77
78	.0064,109	.0074,794	.0085,479	.0096,164	.0106,849	78
79	.0064,931	.0075,753	.0086,575	.0097,397	.0108,219	79
80	.0065,753	.0076,712	.0087,671	.0098,630	.0109,589	80
81	.0066,575	.0077,671	.0088,767	.0199,863	.0110,958	81
82	.0067,397	.0078,630	.0089,863	.0101,095	.0112,328	82
83	.0068,219	.0079,589	.0090,958	.0102,328	.0113,698	83
84	.0069,041	.0080,547	.0092,054	.0103,561	.0115,068	84
85	.0069,863	.0081,506	.0093,150	.0104,794	.0116,438	85
86	.0070,684	.0082,465	.0094,246	.0106,027	.0117,808	86
87	.0071,506	.0083,424	.0095,342	.0107,260	.0119,178	87
88	.0072,328	.0084,383	.0096,438	.0108,493	.0120,547	88
89	.0073,150	.0085,342	.0097,534	.0109,726	.0121,917	89
90	.0073,972	.0086,301	.0098,630	.0110,958	.0123,287	90
91	.0074,794	.0087,260	.0099,736	.0112,191	.0124,657	91
92	.0075,616	.0088,219	.0100,821	.0113,424	.0126,027	92
93	.0076,438	.0089,178	.0101,917	.0114,657	.0127,397	93
94	.0077,260	.0090,137	.0103,013	.0115,890	.0128,767	94
95	.0078,082	.0091,095	.0104,109	.0117,123	.0130,137	95
96	.0078,904	.0092,054	.0105,205	.0118,356	.0131,506	96
97	.0079,726	.0093,013	.0106,301	.0119,589	.0132,876	97
98	.0080,547	.0093,972	.0107,397	.0120,821	.0134,246	98
99	.0081,369	.0094,931	.0108,493	.0122,054	.0135,616	99
100	.0082,191	.0095,890	.0109,589	.0123,287	.0136,986	100

A Table of Simple Intereſt.

The Intereſt of One Pound for a Number of Years.

Years.	At 3 per cent.	3½ per cent.	4 per cent.	4½ per cent	5 per cent.	Years.
1	.03	.035	.04	.045	.05	1
2	.06	.07	.08	.09	.1	2
3	.09	.105	.12	.135	.15	3
4	.12	.14	.16	.18	.2	4
5	.15	.175	.2	.225	.25	5
6	.18	.21	.24	.27	.3	6
7	.21	.245	.28	.315	.35	7
8	.24	.28	.32	.36	.4	8
9	.27	.315	.36	.405	.45	9
10	.3	.35	.4	.45	.5	10
11	.33	.385	.44	.495	.55	11
12	.36	.42	.48	.54	.6	12
13	.39	.455	.52	.585	.65	13
14	.42	.49	.56	.63	.7	14
15	.45	.525	.6	.675	.75	15
16	.48	.56	.64	.72	.8	16
17	.51	.595	.68	.765	.85	17
18	.54	.63	.72	.81	.9	18
19	.57	.665	.76	.855	.95	19
20	.6	.7	.8	.9	1.	20
21	.63	.735	.84	.945	1.05	21
22	.66	.77	.88	.99	1.1	22
23	.69	.805	.92	1.035	1.15	23
24	.72	.84	.96	1.08	1.2	24
25	.75	.875	1.	1.125	1.25	25

The Uſe of the preceding Table.—When the intereſt of any ſum of money is required for any number of days, look in the table for the number of days, and even with that number, under the given rate of intereſt, will be found the intereſt of one pound, for that time, and at that rate; which intereſt, ſo found, being multiplied by the principal ſum, the product anſwers the queſtion.

Example.—What is the intereſt of 462*l.* for 85 days, at 5 *per cent. per annum?*

In the table, even with 85 days, and under 5 *per cent.*, you find the intereſt of 1*l.* to be .0116,438.

Which multiplied by the principal 462, the product will be 5*l.* 7*s.* 7*d.*

N.B. If the principal ſums contain ſhillings and pence, you muſt reduce them into decimal parts, and multiply accordingly.

When the intereſt of any ſum is required for a number of years and days together, as it frequently happens upon paying off a bond or mortgage, add the intereſt of one pound for the years at the end of the foregoing table, to the intereſt of one pound for the odd days; multiply that by the principal ſum, and the product will anſwer the queſtion.

By the aſſiſtance of the following table the intereſt of any ſum of money may be obtained, from a million to a pound, for any number of days, at any rate of intereſt.

N°.	£.	s.	d.	q.	N°.	£.	s.	d.	q.
1000000	2739	14	6	0.99	1000	2	14	9	2.14
900000	2465	15	0	3.29	900	2	9	3	3.12
800000	2191	15	7	1.59	800	2	3	10	0.11
7 0000	1917	16	1	3.89	700	1	18	4	1.10
600000	1643	16	8	2.19	600	1	12	10	2.80
500000	1369	17	3	0.49	500	1	7	5	3.70
400000	1095	17	9	2.95	400	1	1	11	0.50
300000	821	18	4	1.09	300	0	16	5	1.40
200000	574	18	10	3.40	200	0	10	11	2.30
100000	273	19	5	1.70	100	0	5	5	3.15
90000	246	11	6	0.96	90	0	4	11	0.71
80000	219	3	6	0.96	80	0	4	4	2.41
70000	191	15	7	1.59	70	0	3	10	0.11
60000	164	7	8	0.22	60	0	3	3	1.81
50000	136	19	8	2.85	50	0	2	8	6.51
40000	109	11	9	1.48	40	0	2	2	1.21
30000	82	3	10	0.11	30	0	1	7	2.90
20000	54	15	10	2.74	20	0	1	1	0.60
10000	27	7	11	1.37	10	0	0	6	2.30
9000	24	13	1	3.23	9	0	0	5	3.67
8000	21	18	4	1.10	8	0	0	5	1.40
7000	19	3	6	2.96	7	0	0	4	2.41
6000	16	8	9	0.82	6	0	0	3	3.76
5000	13	13	11	2.58	5	0	0	3	1.15
4000	10	19	2	0.55	4	0	0	2	2.52
3000	8	4	4	2.41	3	0	0	1	3.80
2000	5	9	7	0.27	2	0	0	1	1.26
1000	2	14	9	2.14	1	0	0	0	2 63

Multiply the ſum by the number of days, and the product thereof by the rate of intereſt *per cent.* then cut off the two laſt figures to the right hand, and enter the table with what remains to the left; againſt which numbers collected, you have the intereſt for the given ſum.

Example.—What is the intereſt of 100*l.* at 5*l. per cent.* for 365 days?

			£.	s.	d.	q.
N°. of days 365	{ Then in the table againſt 1000 is		2	14	9	2.14
Mult. by 100						
Product - 36500	800	-	2	3	10	0.11
Mult. by - 5 rate *per cent.*	20	-	0	1	1	0.60
1825(00	5	-	0	0	3	1.15
	1825 *Anſ.*		5	0	0	0.00

the intereſt required. See Smart's Tables. Ferguſon's Tracts, &c. For the method of calculating annuities, ſee ANNUITIES.

INTEREST *Compound,* is that which is counted both from the principal, and the ſimple intereſt forborn; called alſo *intereſt upon intereſt.*

Compound intereſt ariſes from the principal and its intereſt put together, as that intereſt becomes due. To find this, it is neceſſary to find the new principal, which is ſtill created by the increaſe of the growing money, at the ſeveral times when the payments of intereſt were due.

Although it be not lawful to lend money at compound intereſt, yet in purchaſing annuities, penſions, reverſions, &c., it is uſual to allow compound intereſt to the purchaſer for his ready money; and, therefore, it is very neceſſary to underſtand this ſubject. Let *p, r, n,* and *m,* be as before;

and let it be required to find m the amount of the ſum p in n years at the rate r. Now, ſuppoſing the amount of 1*l.* in one year to be $\overline{1+r}$, the amount of the ſame ſum in two years will be $\overline{1+r}|^{2}$; for $1 : \overline{1+r} = \overline{1+r} : \overline{1+r}|^{2}$. In like manner $1 : \overline{1+r} = \overline{1+r}|^{2} : \overline{1+r}|^{3}$ the amount of 1*l.* in three years, and the amount of 1*l.* by the ſame rule in n years will be $\overline{1+r}|^{n}$. Conſequently the amount m of the ſum p in n years will be $p \,.\, \overline{1+r}|^{n}$. From this equation we have $p = \frac{m}{\overline{1+r}|^{n}} \;.\;.\;.\;.\; n = \frac{\log. m - \log. p}{\log. \overline{1+r}}$, and $r = \overline{\frac{m}{p}}|^{\frac{1}{n}} - 1$.

Example. 1.—Let $p = 50 \;.\;.\; \overline{1+r} = 1.04 \;.\;.\; n = 30$, then will m (the amount of 50*l.* in 30 years at 4*l. per cent.*) be $= 50 \times \overline{1.04.}|^{30} = 162$*l.* 17.

Ex. 2.—Let $m = 162$*l.* $17 \;.\;.\;.\; n = 30$ $(\overline{1+r} = 1.04)$, the ſum p will then be $= \frac{162.17}{\overline{1.04}|^{30}} = 50$.

Ex. 3.—Let m, p, and r be reſpectively equal to $162.17 \;.\;.\;.\; 50 \;.\;.\;.$ and $.04$, then will n be $= \frac{2.2099705 - 1.6989700}{.0170333} = 30$.

Ex. 4.—Let m, p, and n be reſpectively equal to $162.17 \;.\;.\;.\; 50 \;.\;.\;.$ and 30, and r will be equal to $\overline{\frac{162.17}{50}}|^{\frac{1}{30}} - 1 = .04$.

As the amount of 1*l.* in n years is $\overline{1+r}|^{n}$, the amount of the ſame ſum in $\overline{n-1}$ years will be $\overline{1+r}|^{n-1}$, in $\overline{n-2}$ years $\overline{1+r}|^{n-2}$, &c.; therefore, if 1*l.* be the amount at the end of the firſt year, the ſeries $1 + \overline{1+r} + \overline{1+r}|^{2} + \;.\;.\;.\;.\;.\;.\; \overline{1+r}|^{n-1}$ will expreſs the amouut of 1*l. per annum* in n years, which may eaſily be found $= \frac{\overline{1+r}|^{n} - 1}{r}$, and m (the amount of the annual ſum a) will be $= \frac{a \,.\, \overline{\overline{1+r}|^{n} - 1}}{r}$, hence a will be $= \frac{m\,r}{\overline{1+r}|^{n} - 1}$, and $n = \frac{\log. \overline{m\,r + a} - \log. a}{\log. \overline{1+r}}$.

In order to find the value of r, let the binomial $\overline{1+r}|^{n}$ be expanded, &c., and $\frac{m}{a\,n}$ will be $= 1 + \frac{n-1}{2}\, r + \frac{\overline{n-1} \,.\, \overline{n-2}}{2 \,.\, 3}\, r^{2} + \text{\&c.}$ and $\overline{\frac{m}{a\,n}}|^{\frac{2}{n-1}} =$ $\overline{1 + \frac{n-1}{2}\, r + \frac{\overline{n-1} \,.\, \overline{n-2}}{2 \,.\, 3}\, r^{2}, \text{\&c.}}|^{\frac{2}{n-1}} = 1 + r + \frac{n+1}{12} \,.\, r^{2}$ nearly. Put $\frac{m}{a\,n} - 1 = c$, and $\frac{6}{n+1} = b$, then will r be $= \sqrt{b\,b + 2\,b\,c} - b$.

Example 1.—If $a = 10 \;.\;.\;.\; n = 10 \;.\;.\;.\; \overline{1+r} = 1.04$, m will be $= \frac{\overline{1.04}|^{10} - 1}{.04} = 120.06$*l.*

Ex. 2.—Let n and $\overline{1+r}$ be the ſame as above, and $m = 120.06$, then will $a = \frac{120.06 \times .04}{\overline{1.04}|^{10} - 1} = 10$.

Ex. 3.—Putting $\overline{1+r}$ and $m = 1.04$ and 120.06 reſpectively, and $a = 10$, n will be $= \frac{1.170333 - 1}{.0170333} = 10$.

Ex. 4.—Retaining the ſame values of m and a as in the preceding example, and putting $n = 10$, $c \left(= \overline{\frac{120.06}{100}}|^{\frac{2}{9}} - 1\right)$ will be $= .04146$, $b \left(= \frac{6}{11}\right)$ will be $= .5454$, and r $\left(= \sqrt{.29751 + .04523} - .5454 = .5854 - .5454\right)$ will be $= .04$.

Since $\overline{1+r}$ is the amount of 1*l.* in one year, the converſe of this expreſſion, or $\frac{1}{1+r}$ will be the diſcount of 1*l.* for the ſame time; for if $\overline{1+r}$ to be received at the end of a year is of the ſame value with the preſent payment of 1*l.* by the rule of proportion 1*l.* to be received at the end of a year will be of the ſame value with $\frac{1}{1+r}$ now received, that is, $\overline{1+r} : 1 = 1 : \frac{1}{1+r}$. By the ſame reaſoning $\overline{1+r} : 1 = \frac{1}{1+r} : \frac{1}{\overline{1+r}|^{2}}$ the value of 1*l.* to be received at the end of two years, and hence $\frac{1}{\overline{1+r}|^{n}}$ will be the preſent value of 1*l.* to be received at the end of n years, the value of the ſum a, therefore, to be received at the end of n years will be $\frac{a}{\overline{1+r}|^{n}} = \varpi$; from this equation the value of a will be found $= \varpi \,.\, \overline{1+r}|^{n}$, the value of $n = \frac{\log. a - \log. \varpi}{\log. \overline{1+r}}$, and the value of $r = \overline{\frac{a}{\varpi}}|^{\frac{1}{n}} - 1$.

Example 1.—Let a be $= 20 \;.\;.\; n = 40 \;.\;.\; \overline{1+r} = 1.06$, and $\varpi = \frac{20}{\overline{1.06}|^{40}} = 1.944$.

Ex. 2.—If $\varpi = 1.944$, $\overline{1+r} = 1.06$, and $n = 40$, a $\left(= \overline{1.06}|^{40} \times 1.944\right)$ will be $= 20$.

Ex. 3.—Retaining the values of ϖ and $1 + r$, and putting $a = 20$, n will be $\frac{1.30103 - .2887856}{.0253059} = 40$.

Ex. 4.—If $\varpi = 1.944 \;.\;.\; a = 20$, and $n = 40$, r $\left(= \overline{\frac{20}{1.944}}|^{\frac{1}{40}} - 1\right)$ will be $= .06$.

The value of 1*l.*, payable at the end of n years, being $\frac{1}{\overline{1+r}|^{n}}$, its value at the end of $\overline{n-1}$ years will be $\frac{1}{\overline{1+r}|^{n-1}}$, at the end of $\overline{n-2}$ years $= \frac{1}{\overline{1+r}|^{n-2}}$, and ſo on. It follows, therefore, that the preſent value of the *annual payment* of a for n years will be expreſſed by the ſeries $\frac{a}{1+r} + \frac{a}{\overline{1+r}|^{2}} + \frac{a}{\overline{1+r}|^{3}} \cdots\cdots\cdots + \frac{a}{\overline{1+r}|^{n}} = \frac{a}{r} - \frac{a}{r \,.\, \overline{1+r}|^{n}} = p$; which, therefore, is given when a, n, and r are given. If p, n, r are given, the value of a will be obtained, being $= \frac{pr \,.\, \overline{1+r}|^{n}}{\overline{1+r}|^{n} - 1}$. If a, r, p are given, the value of n will be obtained, being $= \frac{\log.\, a - \log.\, \overline{a - pr}}{\log.\, 1+r}$. In order to find the value of r, when a, p, n are given, let the binomial $\overline{1+r}|^{n}$ in the equation $\frac{a}{r} - \frac{a}{r \,.\, \overline{1+r}|^{n}} = p$, be expanded, &c., and we ſhall have $\frac{p}{na} = 1 - \frac{n+1}{2} r + \frac{\overline{n+1} \,.\, \overline{n+2}}{2 \,.\, 3} r^{2}$, &c.; conſequently $\frac{p}{na}\Big|^{-\frac{2}{n+1}} = \frac{na}{p}\Big|^{\frac{2}{n+1}}$ will be $= \overline{1 - \frac{n+1}{2} r + \frac{\overline{n+1} \,.\, \overline{n+2}}{2 \,.\, 3} r^{2}, \&c.}\Big|^{-\frac{2}{n+1}} = 1 + r - \frac{n-1}{12} r^{2}$ nearly. Let $\frac{na}{p}\Big|^{\frac{2}{n+1}} - 1 = d$, and $\frac{6}{n-1} = b$, then will r be $= b + \sqrt{bb - 2bd}$.

Example 1.—Suppoſing a, n, r to be reſpectively equal to 10, 21, and .05, then will p be $= \frac{10}{.05} - \frac{10}{.05 \times \overline{1.05}|^{21}} = 200 - 71.79 = 128.21$.

Example 2.—Let n, r, and p be reſpectively equal to 21, .05, and 128.21, then will a be $= \frac{.05 \times \overline{105}|^{21}}{\overline{1.05}|^{21} - 1} = \frac{.1393 \times 128.21}{1.78} = 10$.

Example 3.—The quantities r and p being ſtill the ſame and a being equal 10, n will be $= \frac{1 - .5150340}{.0211893} = 21$.

Example 4.—a, p, n being reſpectively equal to 10, 128.21, and 21, r will be equal to $\frac{6}{20} - \sqrt{.06246} = .3 - .25 = .05$.

The following twelve caſes, though they do not ſo frequently occur in practice as the preceding, may not improperly be added here. Let a, as before, be the annuity, n the number of years, m the amount of the annuity in n years, p its value for the ſame time, and r the rate of intereſt.

Caſe 1.—m, p, a being given to find r. In the foregoing caſes m being $= \frac{a \,.\, \overline{1+r}|^{n} - 1}{r}$, and $p = \frac{a \,.\, \overline{1+r}|^{n} - 1}{r \,.\, \overline{1+r}|^{n}}$, $\frac{m}{p}$ therefore will be $= \overline{1+r}|^{n}$, and $p = \frac{\overline{\frac{m}{p} - 1} \,.\, a}{r}$, from which r will be found $= \frac{\overline{m-p} \,.\, a}{mp}$.

Caſe 2.—n, m, p being given to find r. Since $\frac{m}{p} = \overline{1+r}|^{n}$, the log. $\overline{1+r}$ will be $= \frac{\log.\, m - \log.\, p}{n}$, hence $\overline{1+r}$, and conſequently r, will be known.

Caſe 3.—m, r, p being given to find n. This is derived from the preceding caſe, being $= \frac{\log.\, m - \log.\, p}{\log.\, 1+r}$.

Caſe 4.—a, m, p being given to find n ... $\overline{1+r}|^{n}$ being $= \frac{m}{p}$, $\overline{1+r}|^{n} - 1$ will be known; and ſince r is $= \frac{a \,.\, \overline{1+r}|^{n} - 1}{m}$, r will alſo be known, therefore, ſince log. $\overline{1+r}|^{n}$ is $= n \times$ log. $\overline{1+r}$, n will be known, being $= \frac{\log.\, \overline{1+r}|^{n}}{\log.\, 1+r}$.

Caſe 5.—a, r, p being given to find m. By *Caſe* 1, m may be eaſily found $= \frac{ap}{a - pr}$.

Caſe 6.—a, n, p being given to find m. The value of r may be derived from one of the foregoing theorems, in which a, p, n are given (being $= b \pm \sqrt{bb - 2bd}$), and hence $m = p \,.\, \overline{1+r}|^{n}$ will alſo be given.

Caſe 7.—n, r, p being given to find m. As r is given, this value is immediately obtained from the preceding caſe, being $= p \,.\, \overline{1+r}|^{n}$.

Caſe 8.—m, r, a being given to find p. By *Caſe* 1, r is $= \frac{\overline{m-p} \,.\, a}{mp}$, therefore $p = \frac{am}{a + mr}$.

Caſe 9.—n, m, r being given to find p. Since $\frac{m}{p} = \overline{1+r}|^{n}$ p will be $= \frac{m}{\overline{1+r}|^{n}}$.

Caſe 10.—n, m, a being given to find p. Let the value of r be found when m, n, a are given by one of the preceding theorems (being $= \sqrt{bb + 2bc} - b$), and $p = \frac{m}{\overline{1+r}|^{n}}$ will then be given.

Caſe 11.—n, m, p being given to find a. Since $\frac{m}{p} = \overline{1+r}|^{n}$, r will be $= \frac{m}{p}\Big|^{\frac{1}{n}} - 1$, and conſequently given; therefore the value of a may be found from the equation $m = \frac{\overline{1+r}|^{n} - 1}{r}$ to be $= \frac{mr}{\overline{1+r}|^{n} - 1}$.

Caſe 12.—m, p, r being given to find a. Let $\frac{m}{p}$ be ſubſtituted for its equal $\overline{1+r}|^{n}$ in the expreſſion $\frac{mr}{\overline{1+r}|^{n} - 1}$, and a will be $= \dfrac{mr}{\frac{m}{p} - 1} = \dfrac{mpr}{m-p}$.

Dr. Maſkelyne, in his introduction to Taylor's logarithms, has, with the view of facilitating theſe operations, had recourſe to the tables of logarithmic ſines and tangents, by putting $r = t^2 . \mathrm{A}$, $1 + r = \text{ſec.}^2\,\mathrm{A}$, $\overline{1+r}|^{n} = \text{ſec.}^2\,\mathrm{B}$, &c.; thus, in *Caſe* 1, the value of r becomes $= \frac{a}{m} \times t^2 . \mathrm{B}$; for $\frac{m}{p}$ being $= \overline{1+r}|^{n} = \text{ſec.}^2\,\mathrm{B}$, and $\dfrac{\frac{m}{p} - 1}{r} \times a = \dfrac{\text{ſec.}^2\,\mathrm{B} - 1}{r} \times a = \dfrac{t^2 . \mathrm{B}}{r} \times a$, $r \left(= \dfrac{m-p}{mp}\right)$ will be $= \dfrac{t^2 . \mathrm{B}}{m} \times a$. In like manner, in *Caſe* 12, $a = \dfrac{mr}{\overline{1+r}|^{n} - 1}$ becomes $= \dfrac{mr}{\text{ſec.}^2\,\mathrm{B} - 1} = \dfrac{mr}{t^2 . \mathrm{B}} = mr \times co - t^2 . \mathrm{B}$, or $m . t^2 . \mathrm{A} \times co - t^2 . \mathrm{B}$. But though the expreſſions appear more ſimple, I do not know that in general the operations will be found to be much facilitated by theſe means.

In the preceding caſes money has been ſuppoſed to be improved or diſcounted *yearly*. But all theſe different theorems may, however, be applied to the ſolution of caſes which require money to be improved or diſcounted at ſhorter intervals. Thus, ſuppoſing it were required to determine the amount of 50*l.*, when laid out *half yearly*, to accumulate at 4*l.* *per cent.* for the term of 30 years: p is $= 50$, $n = 2 \times 30 = 60$, r the intereſt of 1*l.* for half a year $= .02$, and $m = p . \overline{1+r}|^{n}$ becomes $= 50 \times \overline{1.02}|^{60} = 164.05$. If improved *quarterly* it will be $= 50 \times \overline{1.01}|^{4 \times 30} = 165$.

Again, if it were required to determine the amount of 5*l.* laid out *half yearly*, to be improved at 4*l.* *per cent.* during a term of 10 years. In this caſe $m = \dfrac{a \times \overline{1+r}|^{n} - 1}{r}$ will be $= \dfrac{5 \times \overline{1.02}|^{2 \times 10} - 1}{.02} = 121.486$, and if it be improved *quarterly*, it will be $= \dfrac{5 \times \overline{1.01}|^{4 \times 10} - 1}{.01} = 122.2$.

In like manner, if money be diſcounted at ſhorter intervals than a year, the preſent value will be obtained from the expreſſion $\dfrac{1}{\overline{1+r}|^{n}}$; thus, let the preſent value be required of 20*l.* payable at the end of 40 years, ſuppoſing money to be diſcounted every half year at 6*l.* *per cent.* Here n becomes $= 2 \times 40 = 80$, $r = \frac{.06}{2} = .03$, and conſequently $\pi = \dfrac{a}{\overline{1+r}|^{n}} = \dfrac{20}{\overline{1.03}|^{80}} = 1.8795$.

Let k be any fraction of a year in which money is to be improved or diſcounted, and the amount or preſent value may always be found from the amount or preſent value when money is improved or diſcounted yearly, being the ſame with ſuch amount or value at $\frac{r}{k}$ intereſt for kn years. Thus, the amount of 50*l.* improved *half yearly* at 4*l.* *per cent.* for 30 years is the ſame with the amount of 50*l.* improved *yearly* for 60 years at 2*l.* *per cent.*; the amount of 5*l.* *per ann.* improved half yearly for 10 years at 4*l.* *per cent.*, is the ſame with the amount of 5*l.* *per ann.* improved yearly for 20 years at 2*l.* *per cent.*; and 10*l.* diſcounted half yearly for 40 years at 6*l.* *per cent.* is the ſame with 10*l.* diſcounted yearly for 80 years at 3*l.* *per cent.* The different values of annuities, when payable yearly, half yearly, quarterly, or at ſhorter intervals, may in the ſame manner be deduced from the preceding theorems, but theſe are explained in the article ANNUITIES.

M. De Moivre, M. D'Alembert, and ſome others, inſtead of making the intereſt of 1*l.* for the kth part of a year $= \frac{r}{k}$, have choſen to make it $= \overline{1+r}|^{\frac{1}{k}} - 1$, and hence the amount of 1*l.* in n years, or its preſent value at the end of n years, will be the ſame, whether money be improved or diſcounted yearly, or at ſhorter intervals. But the amount of 1*l.* *per ann.* will be to its amount when improved yearly in the conſtant ratio of r to $k \times \overline{1+r}|^{\frac{1}{k}} - 1$, and the value of an annuity of 1*l.* will be to its value, when paid yearly, inverſely as r to $k . \overline{1+r}|^{\frac{1}{k}} - 1$, whatever the length of the term during which the money is to accumulate, or the annuity is to continue. Now, it is well known that the difference between the values of annuities payable yearly, and their values, when payable half-yearly, quarterly, or at ſhorter intervals, is always leſſened as the term is extend d, ſo that if the annuity be perpetual, the values will be the ſame, whether the payments are made yearly, or in any fractional part of the year; which can never be the caſe on the ſuppoſition above mentioned. When n is $= \log. \dfrac{r}{r - k . \overline{1+r}|^{\frac{1}{k}} - 1} \div \log. \overline{1+r}$, an annuity payable every kth part of the year, will be equal to the perpetuity, ſo that an annuity payable *half-yearly*, at 5*l.* *per cent.* for $90\frac{1}{2}$ years, or *quarterly* for 80 years, will be equal to the ſame annuity payable *yearly* for ever. And at 6*l.* *per cent.* the annuities will be of equal value if the term be only $72.\frac{1}{2}$ years in the one caſe, or $65.\frac{1}{5}$ years in the other. But while theſe rules, when the term is very long, give the values of *annuities* payable at ſhorter intervals than a year too high, they always, on the contrary, and eſpecially when the term is very long, give the *amount* of a ſum much too low. Thus ſuppoſing *one penny* to be laid out at 5*l.* *per cent.* compound intereſt at the birth of our Saviour, or 1810 years ago, it will accumulate, when money is improved *yearly*, to a ſum which is equal to 381,860,000 globes of ſolid gold, each equal to the earth in magnitude. When improved *half-yearly*, to a ſum which is equal to 1,121,470,000 of ſuch globes, and when improved *quarterly*, to a ſum which is equal to 1,945,680,000 ſuch globes; ſo that although in this long time the accumulation is nearly three times greater when money is improved *half-yearly*, and more than five times greater when improved *quarterly* than it is when money is improved *yearly*, yet according to the ſuppoſition that $\overline{1+r}|^{\frac{1}{k}}$ is the amount of 1*l.* in the kth part of a year, or $\overline{1+r}|^{\frac{kn}{k}} =$ its amount in n years, its accumulation will be the ſame, whether money is improved yearly, half-yearly, or quarterly. It may eaſily be ſhewn that $\overline{1+r}|^{\frac{1}{k}} - 1$ is always leſs than $\frac{r}{k}$, or, in other words, that this expreſſion does not give the full intereſt of 1*l.* for the kth part of a year. It is no wonder, therefore, that any theorems derived from a principle ſo erroneous, ſhould, like the preceding, lead to concluſions which are not only incorrect but abſurd

To the foregoing, a great number of other caſes might be added. But it will be ſufficient to give only a few of the moſt curious and important; ſome of which having occurred in practice, it would perhaps be improper to omit them.

Theorem 1.—To determine the time in which 1*l.* will be doubled by compound intereſt.

Solution.—Since $\overline{1 + r}|^{n}$ the amount of 1*l.* at the end of n years is in this caſe $= 2\ n$, or the required time, will be $= \frac{\log.\ 2}{\log.\ \overline{1 + r}}$; from which it appears that money doubles itſelf at 3*l. per cent.* in $23\frac{1}{2}$ years nearly; at 4*l. per cent.* in $17\frac{2}{3}$ years; at 5*l. per cent.* in $14\frac{1}{5}$ years; at 6*l. per cent.* in $11\frac{9}{10}$ years; at 8*l. per cent.* in 9 years; at 10*l. per cent.* in $7\frac{1}{4}$ years; and at 12*l. per cent.* in $6\frac{1}{6}$ years nearly.

Theorem 2.—Suppoſing money to be doubled by compound intereſt in n years, required r the rate of intereſt at which it has been improved.

Solution.—The log. $\overline{1 + r}$, by the preceding theorem being given $= \frac{\log.\ 2}{n}$, the value of r will alſo be given. Or, if the hyperbolic logarithm of 2 be expreſſed by h, it will be found $= 1 - \frac{\sqrt{n - 2\ h}}{\sqrt{n}}$.

Theorem 3.—Suppoſing 1*l.* to be doubled in n years at the intereſt r, and in m years at the intereſt $2\ r$, to find the ratio of m to n.

Solution.—Since $\overline{1 + r}|^{n}$ and $\overline{1 + 2\ r}|^{m}$ are each of them equal to 2, they will be equal to each other, and conſequently m will be to n as log. $\overline{1 + r}$ to log. $\overline{1 + 2\ r}$, or by fluxions and the binomial theorem, as $\frac{1}{2} + \frac{\overline{1 - r}\ .\ r}{4}$ to one very nearly, or ſtill more nearly, as $\frac{1}{2} + \frac{\overline{1 - r}\ .\ r}{4} + \frac{\overline{7 - 9\ r}\ .\ r^{3}}{24}$ to one.

Examples.—At 3 and 6 *per cent.* m and n are reſpectively to each other in the ratio of .50746 to one; at 4 and 8 *per cent.* of .50934 to one; at 5 and 10 *per cent.* of .51197 to one; at 6 and 12 *per cent.* of 51417 to one; at 8 and 16 *per cent.* of .51889 to one; at 10 and 20 *per cent.* of .52269 to one; and at 12 and 24 *per cent.* of .52681 to one. From theſe examples it appears that the higher the intereſt the greater will be the ratio of m to n. It follows alſo from the expreſſion $\frac{1}{2} + \frac{\overline{1 - r}\ .\ r}{4}$, &c. that money will not double itſelf at $2\ r$ intereſt in half the time that it doubles itſelf at r intereſt. The truth of this concluſion may perhaps be more ſatisfactorily proved in the following manner. Since $m : n = \log.\ \overline{1 + r} : \log.\ \overline{1 + 2\ r} = \log.\ \overline{1 + r} : \log.\ \overline{1 + r} + \log.\ \overline{1 + \frac{r}{r + 1}}$, we ſhall have $m : n = 1 : 1 + \frac{\log.\ \overline{1 + \frac{r}{\overline{1 + r}}}}{\log.\ \overline{1 + r}}$. But this latter fraction muſt be leſs than unity, therefore m will always be to n in a greater ratio than as 1 to 2.

Theorem 4.—To determine the ſum to which an annuity a will accumulate at the end of n years, ſuppoſing ſuch annuity to be received annually, and its intereſt to be improved *half-yearly*.

Solution.—The ſeries expreſſing theſe accumulations is

$$a \left(\overline{1 + \frac{r}{2}}|^{2} + \overline{1 + \frac{r}{2}}|^{4} + \overline{1 + \frac{r}{2}}|^{6} \ldots\ldots + \overline{1 + \frac{r}{2}}|^{2\,n-2} \right) = a \times \frac{\overline{1 + \frac{r}{2}}|^{2\,n} - 1}{\overline{1 + \frac{r}{2}}|^{2} - 1}.$$

Example.—Let $a = 500$, $n = 30$, and $r = .05$, the foregoing expreſſion will then be $\frac{\overline{1.025}|^{60} - 1}{\overline{1.025}|^{2} - 1} \times 500 = 67.1567 \times 500 = 33{,}578.35$. If the above annuity and its intereſt be improved yearly, the accumulation will be equal to 33,219.4*l.* and if both principal and intereſt be improved half-yearly, they will amount to 33,998*l.*

Theorem 5.—To determine the ſum p which at compound intereſt will amount in the time n to N, and in the time m to M.

Solution.—In this caſe $p\ .\ \overline{1 + r}|^{n} = \text{N}$, and $p\ .\ \overline{1 + r}|_{m} = \text{M}$, from which two equations, the log. of p may be found $= \frac{m\ .\ \log.\ \text{N} - n\ .\ \log.\ \text{M}}{m - n}$.

Corollary 1.—If the ſum p amounts to N in the time n, the log. of the amount M in the time m will be $= \frac{m\ .\ \log.\ \text{N} - \overline{m - n}\ .\ \log.\ p}{n}$.

Corollary 2.—If the ſum p in n years amounts to N, the time m in which it will amount to M, will be $= \frac{n\ .\ \overline{\log.\ \text{N} - \log.\ p}}{\log.\ \text{M} - \log.\ p}$.

Theorem 6.—Suppoſing the ſum a to become payable annually for n years, at what time t might all the payments ($n\ a$) be made at once, ſo as to be an equivalent to the ſeveral annual payments.

Solution.—The preſent value of the annuity a for n years (ſee ANNUITIES) being $= \frac{a}{r} - \frac{a}{r\ .\ \overline{1 + r}|^{n}}$, will in this caſe be $= \frac{n\ a}{\overline{1 + r}|^{t}}$, from which equation t may be found

$$= \frac{\log.\ n\ r + \log.\ \overline{1 + r}|^{n} - \log.\ \overline{\overline{1 + r}|^{n} - 1}}{\log.\ \overline{1 + r}}.$$

Example.—Let $a = 10$, $n = 15$, and $r = .05$, or, in other words, let an annuity of 10*l.* be payable annually for 15 years at 5*l. per cent.* at what period will the ſingle payment of 150*l.* be an equivalent to this annuity? In this caſe t will be $=$

$$\frac{\log.\ .5 + \log.\ \overline{1.05}|^{15} - \log.\ \overline{\overline{1.05}|^{15} - 1}}{\log.\ 1\ .\ 05} = 7.5$$

nearly, or $7\frac{1}{2}$ years. By the ſame rule, if the annuity were for 30 or 50 years, a ſingle payment made at the end of 13.7 years, or at the end of $20.\frac{1}{2}$ years, will be an equivalent to ſuch annuities reſpectively.

Corollary.—If the payments, inſtead of always being a, vary each year, ſo that in the firſt, ſecond, and third years they are a, b, c, d, &c. reſpectively, and the whole amount of them be p, the time t will be =

$$\frac{\log.\ p - \log.\left(\frac{a}{1+r} + \frac{b}{\overline{1+r}|^{2}} + \frac{c}{\overline{1+r}|^{3}} + \&c.\right)}{\log.\ \overline{1+r}}$$

Theorem 7.—Suppoſing the ſum b to be now borrowed on condition that the annuity c ſhould be paid in diſcharge of it, after the expiration of n years; for how many years t ſhould ſuch annuity be continued from that time ſo as to be an equivalent to the ſum ſo advanced?

Solution.—The amount of b in n years being $b\ .\ \overline{1+r}|^{n}$, and the value of the annuity c for t years being $\frac{c\ .\ \overline{1+r}|^{t} - c}{r\ \overline{1+r}|^{t}}$, theſe two expreſſions, by the condition of the problem, will be equal to each other. Let $\frac{c}{c - b\,r\ .\ \overline{1+r}|^{n}}$ be denoted by d, then may t be eaſily found $= \frac{\log.\ d}{\log.\ \overline{1+r}}$. Thus, if $b = 1032 \ldots\ldots c = 400 \ldots n = 37 \ldots$ and $r = .05$, d will be $= \frac{400}{400 - .05 \times 1032 \times 6.081} = 46.4$, and $t = \frac{\log.\ \text{of}\ 46.4}{\log.\ \text{of}\ 1.05} = 31.4$, that is, if 1032*l.* be now borrowed on condition that the debt ſhould be diſcharged at the end of 37 years by an annual payment of 400*l.* ſuch payment, computing at 5*l.* *per cent.* ſhould be continued for $31\frac{2}{5}$ years.

Corollary.—If c be $= \overline{1+r}|^{n} \times b\,r$, the annual payment muſt be continued for ever; if c be leſs than $b\,r \times \overline{1+r}|^{n}$, the debt can never be repaid.

From any four of the above quantities being given the fifth may be obtained without much difficulty. But it cannot be neceſſary to purſue this ſubject further, as the ſolution of theſe or any other caſes in compound intereſt may be eaſily derived from the principles already explained in this article.

See on this ſubject, Jones's Synopſis Palmariorum Matheſeos, part. i. ſect. 3. chap. 10. Gardiner's Tables of Logarithms, p. 13. 3d edition. Philoſ. Tranſactions, vol. lx. p. 508. and vol. lxvi. p. 109. Taylor's Tables of Logarithms, p. 30; and Mazere's Scriptores Logarithmici, vol. v. p. 220. See alſo ANNUITIES *Certain*, and DISCOUNT.

A mercantile friend has favoured the editor with the following *univerſal* rule for finding the intereſt upon *any* ſum at *any* rate, for *any* number of days.

Multiply the *ſum* by the *rate* of intereſt, and multiply that product by the *number* of days; then divide that product by 36500. The quotient will be the anſwer.

Now ſuppoſe the queſtion to be, What is the intereſt upon 127*l.* at 3*l.* *per cent. per annum* for 254 days?

```
£.   £.
127 at 3 for 254 days.
  3 Rate of intereſt,
------
381 Firſt product.
254 Days.
------
 1524
1905
762
------  £.  s.  d.
36500)96774( 2  13  0¼ Anſwer.
```

```
36500)96774( 2l. 13s. 0¼d. Brought over.
      73000
      -----
      23774
         20 Shillings.
      ------
      475480(13
      36500
      ------
      110480
      109500
      ------
         980
          12 Pence.
       -----
       11760(0
           4 Farthings.
       -----
       47040(1
       36500
       -----
       10540 Remainder.
```

It is evident, that in multiplying 127 by 3, according to the *firſt* operation of the rule, the amount is *increaſed* one hundred times too much, for the product 381 is only three, and eighty-one hundredths, or 381*l.* which is equal to 3*l.* 16*s.* 2¼*d.* or the intereſt of 127*l.* at 3 *per cent.* for one year. Therefore, to correct this *firſt* error, the product 381 muſt be divided by 100, and it will be right.

But in following the rule, the *firſt* error is *continued*, and we go on to multiply that product by the number of days, by which it is alſo evident that the product 96774 includes a *ſecond* error of 365 times too much, being for *days* inſtead of for *years*, and the amount of the *two* errors taken together is 100 times 365 times too much, or 36,500 times too much, therefore, to bring it right, it muſt be divided by that number.

This explains the principle of the firſt univerſal rule, which requires *three* operations, *becauſe* it is adapted to *any* rate of intereſt whatever.

To find the intereſt upon any ſum at 5 *per cent.* for any number of days:

Rule.—Multiply the ſum by the number of days, and divide the product by 7300.

Example.

What is the intereſt upon 2745*l.* for 365 days?

```
          365
        -------
         13725
        16470
       8235
       -------  £.  s. d.
7300)1001925(137  5  0
      7300
      -----
      27192
      21900
      ------
       52925
       51100
       -----
        1825
          20
       ------
       36500(5
       36500
```

Intereſt at 5 *per cent.* being the moſt common rate in Great Britain, may in general be worked as ſpeedily by the above ſhort rule as it can be found by referring to the tables in common uſe.

The editor's correſpondent has never yet met with ſo ſhort a rule as this, and as 5 *per cent.* is the general and legal rate of intereſt in this country, it muſt be very uſeful to mercantile perſons.

The explanation of the principle of the firſt rule being underſtood as above, there can be no difficulty in the laſt rule, it being derived from it.

When the intereſt is at any other rate, take the following rule:

Multiply the ſum by the number of days; multiply that product by the rate of intereſt, then divide by 36500.

Example.

What is the intereſt upon 1612*l.* for 154 days at 4 *per cent.*?

```
            154
         -------
           6448
          8060
         1612
         -------
         248248
              4
         -------  £. s. d.
  36500)992992(27 4 1¼
         73000
         -------
         262992
         255500
         -------
           7492
             20
         -------
         149840(4
         146000
         -------
           3840
             12
         -------
          46080(1
          36500
         -------
           9580
              4
         -------
          38320(1
          36500
         -------
           1820
```

If the rate of intereſt is not in even pounds, ſuch as 2½, 3½, or 4½ *per cent.* take the following rule:

Multiply the ſum by the number of days; multiply the product by double the rate of intereſt, then divide by 73000.

Example:—What is the intereſt upon 2746*l.* for 328 days at 3½ *per cent.*?

```
           2746
            328
         -------
          21968
          5492
         8238
         -------
         900688
              7
         -------  £. s. d
  73000)6304816(86 7 4
```

```
73000)6304816(86l. 7s. 4d. Brought over,
      584000
      -------
       464816
       438000
      -------
        26816
           20
      -------
       536320(7
       511000
      -------
        25320
           12
      -------
       303840(4
       292000
      -------
        11840
```

Any calculation made by the ſecond rule may be proved by the third rule, and *vice verſâ*. Therefore every calculation of intereſt at any rate whatever, may be made by either of thoſe rules. When an intereſt account of conſiderable length is required to be made out, it may be done as much ſooner by this method than it can be done by any intereſt tables whatever, as there are different lines to be caſt.

By the following table of rules, intereſt upon any ſum for any number of days at the ſeveral rates of ¼, ½, 1, 1¼, 2, 2½, 4, 5, and 10 *per cent. per annum*, may be caſt by two operations only, namely, one multiplication and one diviſion.

Firſt, multiply the ſum by the number of days, then divide the product by the number ſtanding againſt the rate of intereſt, and the quotient will be the anſwer.

For intereſt at			divide by
¼ *per cent.*			146000
½	-	-	73000
1	-	-	36500
1¼	-	-	29200
2	-	-	18250
2½	-	-	14600
4	-	-	9125
5	-	-	7300
10	-	-	3650

The above rule may be ſtill further ſhortened in practice, by cutting off one figure each from the dividend and the diviſor, and in that caſe it will not in any inſtance make more than one farthing difference.

Intereſt is the compenſation which the borrower pays to the lender, for the profit which he has an opportunity of making by the uſe of the money. Part of that profit naturally belongs to the borrower, who runs the riſk and takes the trouble of employing it; and part to the lender, who affords him the opportunity of making this profit. Intereſt has been ſometimes confounded with uſury; and the latter term, the ſound of which is odious, has been occaſionally miſapplied and eſtimated on erroneous principles. (See Usury.) Accordingly thoſe who are enemies to intereſt in general, making no diſtinction between that and the kind of uſury which is criminal, hold any increaſe of money to be indefenſibly uſurious. This they ground, as well on the prohibition of it by the law of Moſes among the Jews, as alſo upon what is ſaid to be laid down by Ariſtotle in a paſſage, (Polit. l. i. c. 10.) ſuſpected to be ſpurious, that money is naturally barren, and that to make it breed money is prepoſterous, and a perverſion of the end of its inſtitution, which was only to ſerve the purpoſes of exchange, and not of increaſe. Hence the ſchool divines have branded the practice of taking intereſt as contrary to the divine law, both natural and revealed; and the canon law (Decret. l. v. tit. 19,) has proſcribed the taking of any, the leaſt, increaſe for the loan of money as a mortal ſin. But it has been obſerved in reply, that the Moſaical precept was clearly a political, and not a moral precept. It only prohibited the Jews from taking uſury of their brethren; but, in expreſs words, (Deut. xxiii. 20.) permitted them to take it of a ſtranger, which proves that the taking of moderate uſury, as a reward for the uſe, for ſo the word ſignifies, is not *malum in ſe;* ſince it was allowed where any but an Iſraelite was concerned. As to the reaſon, deduced from the natural barrenneſs of money, and aſcribed to Ariſtotle, the ſame may with equal force be alleged of houſes, which never breed houſes; and of twenty other things, which nobody doubts it is lawful to make profit of, by letting them to hire. And though money was originally uſed for the purpoſes of exchange, yet the laws of any ſtate may be well juſtified in permitting it to be turned to the purpoſes of profit, if the convenience of ſociety (the great end for which money was invented) ſhall require it. That the allowance of moderate intereſt tends greatly to the benefit of the public, eſpecially in a trading country, will appear from that generally acknowledged principle, that commerce cannot ſubſiſt without mutual and extenſive credit. Unleſs money can be borrowed, trade cannot be carried on; and if no premiums were allowed for the hire of money, few perſons would care to lend it; or at leaſt the eaſe of borrowing at a ſhort warning (which is the life of commerce) would be entirely at an end. Thus, in the dark ages of monkiſh ſuperſtition and civil tyranny, when intereſt was laid under a total interdict, commerce was alſo at its loweſt ebb, and fell entirely into the hands of the Jews and Lombards: but when men's minds came to be more enlarged, when true religion and real liberty revived, commerce grew again into credit; and again introduced with itſelf its inſeparable companion, the doctrine of loans upon intereſt. And, as to any ſcruples of conſcience, ſince all other conveniences may either be bought or hired, but money only can be hired, there ſeems to be no greater oppreſſion in taking a recompence or price for the hire of this than of any other convenience. To demand an exorbitant price is equally contrary to conſcience, for the loan of a horſe, or the loan of a ſum of money; but a reaſonable equivalent for the temporary inconvenience, which the owner may feel by the want of it, and for the hazard of his loſing it entirely, is not more immoral in one caſe than it is in the other. Indeed, the abſolute prohibition of lending upon any, even moderate intereſt, introduces the very inconvenience which it ſeems meant to remedy. The neceſſity of individuals will make borrowing unavoidable. Without ſome profit allowed by law, there will be but few lenders: and thoſe principally bad men, who will break through the law, and take a profit; and then will endeavour to indemnify themſelves from the danger of the penalty, by making that profit exorbitant. Accordingly it is well obſerved by Grotius, (De Jur. Bell. et Pac. l. ii. c. 12. § 22.) "if the compenſation allowed by law does not exceed the proportion of the hazard run, or the want felt, by the loan, its allowance is repugnant neither to the revealed nor the natural law: but if it exceeds thoſe bounds, it is then oppreſſive uſury: and though the municipal laws may give it impunity, they never can make it juſt." The exorbitance or moderation of intereſt depends upon two circumſtances, the inconvenience of parting with it for the preſent, and the hazard of loſing it entirely. The rate of intereſt will be generally in a compound ratio, formed out of the inconvenience and the hazard.

Mr. Locke, Mr. Law, and Mr. Monteſquieu, as well as many other writers, ſeem to have imagined that the increaſe of the quantity of gold and ſilver, in conſequence of the diſcovery of the Spaniſh Weſt Indies, was the real cauſe of the lowering the rate of intereſt through the greater part of Europe. Thoſe metals, they ſay, having become of leſs value than ſilver, the uſe of any particular portion of them became neceſſarily of leſs value too, and conſequently the price which could be paid for it. This notion appears at firſt ſight very plauſible; but it has been conteſted, not to ſay refuted, by Mr. Hume and Dr. Smith. It is in vain, ſays the firſt of theſe writers, (Eſſays, vol. i. eſſ. iv.) to look for the cauſe of the fall or riſe of intereſt in the greater or leſs quantity of gold and ſilver, which is fixed in any nation. High intereſt ariſes from *three* circumſtances: A great demand for borrowing; little riches to ſupply that demand; and great profits ariſing from commerce: and theſe circumſtances are a clear proof of the ſmall advance of commerce and induſtry, not of the ſcarcity of gold and ſilver. Low intereſt, on the other hand, proceeds from the three oppoſite circumſtances: a ſmall demand for borrowing; great riches to ſupply that demand; and ſmall profits ariſing from commerce: and theſe circumſtances are all connected together, and proceed from the increaſe of induſtry and commerce, not of gold and ſilver. In inveſtigating the cauſes and effects of a great or ſmall demand for borrowing, Mr. Hume traces the origin and eſtabliſhment of the *landed* intereſt; and he obſerves, after tracing the manner in which ſome perſons become proprietors of land, and the influence of a ſettled revenue on thoſe who are entirely without occupation, that the prodigals among the landholders will always be more numerous than the miſers. In a ſtate, therefore, where there is nothing but a landed intereſt, as there is little frugality, the borrowers muſt be very numerous, and the rate of intereſt muſt bear proportion to it; the difference depends not on the quantity of money, but on the habits and manners which prevail. By this alone the demand for borrowing is increaſed or diminiſhed. Were money ſo plentiful as to make an egg be ſold for ſixpence; ſo long as there are only landed gentry and peaſants in the ſtate, the borrowers muſt be numerous, and intereſt high. The rent for the ſame farm would be heavier and more bulky; but the ſame idleneſs of the landlord, with the higher price of commodities, would diſſipate it in the ſame time, and produce the ſame neceſſity and demand for borrowing. The ſecond circumſtance, above-mentioned, *viz.* the great or little riches to ſupply the demand, depends alſo on the habits and way of living of the people, not on the quantity of gold and ſilver. In order to have, in any ſtate, a greater number of lenders, it is not ſufficient nor requiſite that there be great abundance of the precious metals. It is only requiſite that the property, or command of that quantity, which is in the ſtate, whether great or ſmall, ſhould be collected in particular hands, ſo as to form conſiderable ſums, or compoſe a great *monied* intereſt; this begets a number of lenders, and ſinks the rate of uſury: and this, Mr. Hume affirms, depends not on the quantity of ſpecie, but on particular manners and cuſtoms, which make the ſpecie gather into ſeparate ſums or maſſes of conſiderable value. The reduction of intereſt muſt proceed from an increaſe of induſtry and frugality, of arts and commerce. Beſides the peaſants and the proprietors of land, there muſt be another rank of men, who, receiving from the former the rude materials, work them into their proper form, and retain part for their own uſe and ſubſiſtence. As induſtry increaſes, and the views of men enlarge, it is found that the moſt remote parts of the ſtate can aſſiſt each other as well as the more contiguous, and that this intercourſe of good offices may be carried on to the greateſt extent and intricacy. Hence the origin of " Merchants," who ſerve as agents between different parts of the ſtate ; and in all the tranſactions which this buſineſs of connecting agency or merchandize occaſions, it is neceſſary and reaſonable that a conſiderable part of the commodities and labour ſhould belong to the merchant, to whom, in a great meaſure, they are owing. Theſe commodities he will ſometimes preſerve in kind, or more commonly convert into money, which is their common repreſentation. If gold and ſilver have increaſed in the ſtate, together with the induſtry, it will require a great quantity of theſe metals to repreſent a great quantity of commodities and labour. If induſtry alone has increaſed, the prices of every thing muſt ſink, and a ſmall quantity of ſpecie will ſerve as a repreſentative. Trade, ſays Mr. Hume, increaſes frugality, and among merchants there is the ſame overplus of miſers above prodigals, as, among the poſſeſſors of land, there is the contrary. Commerce increaſes induſtry, as well as frugality. Merchants beget induſtry, and by their frugality they acquire great power over that induſtry, and collect a large property in the labour and commodities which they are the chief inſtruments in producing. Without commerce the ſtate muſt conſiſt chiefly of landed gentry, whoſe prodigality and expence make a continual demand for borrowing ; and of peaſants, who have no ſums to ſupply that demand. The money never gathers into large ſtocks or ſums, which can be lent at intereſt. Commerce alone aſſembles it into conſiderable ſums ; and this effect it has merely from the induſtry which it begets, and the frugality which it inſpires, independent of that particular quantity of precious metal which may circulate in the ſtate. Thus an increaſe of commerce neceſſarily raiſes a great number of lenders, and by that means produces lowneſs of intereſt. The next conſideration is, that this increaſe of commerce diminiſhes the profits ariſing from that profeſſion, and gives riſe to the *third* circumſtance, above-mentioned, requiſite to produce lowneſs of intereſt. When commerce has become extenſive, and employs large ſtocks, there muſt ariſe rivalſhips among the merchants, which diminiſh the profits of trade, at the ſame time that they increaſe the trade itſelf. The low profits of merchandize induce the merchants to accept more willingly of a low intereſt, when they leave off buſineſs, and begin to indulge themſelves in eaſe and indolence. Low intereſt and low profits both ariſe from an extenſive commerce, and mutually forward each other. No man will accept of low profits, where he can have high intereſt ; and no man will accept of low intereſt, where he can have high profits. An extenſive commerce, by producing large ſtocks, diminiſhes both intereſt and profits ; and is always aſſiſted, in its diminution of the one, by the proportional ſinking of the other. Thoſe, ſays our author, who have aſſerted, that the plenty of money was the cauſe of low intereſt, ſeem to have taken a collateral effect for a cauſe ; ſince the ſame induſtry, which ſinks the intereſt, commonly acquires great abundance of the precious metals. But though plenty of money and low intereſt naturally ariſe from commerce and induſtry, they are altogether independent of each other. As to the reduction of intereſt, which has taken place in England, France, and other kingdoms of Europe, that have no mines, it has been gradual ; and has not proceeded, ſays Mr. Hume, from the increaſe of money, conſidered merely in itſelf ; but from that of induſtry, which is the natural effect of the former increaſe, in that interval, before it raiſes the price of labour and proviſions. Dr. Smith (Wealth of Nations, vol. ii. p. 39.) coincides in inion with Mr. Hume, and propoſes a very ſhort and plain gument, which, he thinks, may ſerve to explain the fallacy which thoſe have been miſled who aſcribe the lowering of the rate of intereſt to the increaſe of the quantity of gold and ſilver. Before the diſcovery of the Spaniſh Weſt Indies, 10 *per cent.* ſeems to have been the common rate of intereſt through the greater part of Europe. It has ſince that time in different countries ſunk to 6, 5, 4, and 3 *per cent.* Let us ſuppoſe that in every particular country the value of ſilver has ſunk preciſely in the ſame proportion as the rate of intereſt ; and that in thoſe countries, for example, where intereſt has been reduced from 10 to 5 *per cent.*, the ſame quantity of ſilver can now purchaſe juſt half the quantity of goods which it could have purchaſed before. This ſuppoſition will not, as Dr. Smith believes, be found any where agreeable to the truth, but it is the moſt favourable to the opinion now examined ; and even upon this ſuppoſition it is utterly impoſſible that the lowering of the value of ſilver could have the ſmalleſt tendency to lower the rate of intereſt. If 100*l.* are in theſe countries now of no more value than 50*l.* were then, 10*l.* muſt now be of no more value than 5*l.* were then. Whatever were the cauſes which lowered the value of the capital, the ſame muſt neceſſarily have lowered that of the intereſt, and exactly in the ſame proportion. The proportion between the value of the capital and that of the intereſt muſt have remained the ſame, though the rate had never been altered. By altering the rate, on the contrary, the proportion between theſe two values is neceſſarily altered. If 100*l.* now are worth no more than 50*l.* were then, 5*l.* now can be worth no more than 2*l.* 10*s.* were then. By reducing the rate of intereſt, therefore, from 10 to 5 *per cent.*, we give for the uſe of a capital, which is ſuppoſed to be equal to one-half of its former value, an intereſt which is equal to one-fourth only of the value of the former intereſt. Any increaſe in the quantity of ſilver, while that of the commodities circulated by means of it remained the ſame, could have no other effect than to diminiſh the value of that metal. The nominal value of all ſorts of goods would be greater, but their real value would be preciſely the ſame as before. They would be exchanged for a greater number of pieces of ſilver, but the quantity of labour which they could command, the number of people whom they could maintain and employ, would be preciſely the ſame. The capital of the country would be the ſame, though a great number of pieces might be requiſite for conveying any equal portion of it from one hand to another. The funds for maintaining productive labour being the ſame, the demand for it would be the ſame. Its price, or wages, therefore, though nominally greater, would really be the ſame, they would be paid in a greater number of pieces of ſilver ; but they would purchaſe only the ſame quantity of goods. The profits of ſtock would be the ſame both nominally and really. The profits of ſtock are not computed by the number of pieces of ſilver with which they are paid, but by the proportion which thoſe pieces bear to the whole capital employed. The common proportion between capital and profit would be the ſame, and conſequently the common intereſt of money ; what can commonly be given for the uſe of money being neceſſarily regulated by what can commonly be made of it. The intereſt of money, keeping pace always with the profits of ſtock, might be greatly diminiſhed, though the value of money, or the quantity of goods which any particular ſum could purchaſe, was greatly augmented.

In countries, ſays our ingenious author, where intereſt is permitted, the law, in order to prevent the extenſion of uſury, generally fixes the higheſt rate which can be taken without incurring a penalty. This rate ought always to be ſomewhat above the loweſt market price, or the price which is commonly paid for the uſe of money by thoſe who can give the moſt undoubted ſecurity. If this legal rate ſhould be fixed below the loweſt market rate, the effects of this fixation muſt be nearly the ſame as thoſe of a total prohibition of intereſt. The creditor will not lend his money for leſs than the uſe of it is worth, and the debtor muſt pay him for the riſk which he runs by accepting the full value of that uſe. The legal rate, though it ought to be ſomewhat above, ought not to be much above the loweſt market rate. If the legal rate of intereſt in Great Britain, for example, was fixed ſo high as 8 or 10 *per cent.*, the greater part of the money which was to be lent, would be lent to prodigals and projectors, who alone would be willing to give this high intereſt. Where the legal rate of intereſt is fixed but a very little above the loweſt market rate, ſober people are univerſally preferred, as borrowers, to prodigals and projectors. Then a great part of the capital of the country is thrown into the hands in which it is moſt likely to be employed with advantage. The ordinary market price of land depends every where upon the ordinary market rate of intereſt. If the rent of land ſhould fall ſhort of the intereſt of money by a conſiderable difference, nobody would buy land, which would ſoon reduce its ordinary price. On the contrary, if the advantages ſhould much more than compenſate the difference, every body would buy land, which would ſoon again raiſe its ordinary price. When intereſt was at 10 *per cent.*, land was commonly ſold for 10 and 12 years' purchaſe. As intereſt ſunk to 6, 5, and 4 *per cent.*, the price of land roſe to 20, 25, and 30 years' purchaſe. As to the legal intereſt in this country, it has varied and decreaſed for 200 years paſt according to the acceſſion of trade, the introduction of paper credit, and other circumſtances. The ſtat. 37 Hen. VIII. c. 9. confined intereſt to 10 *per cent.* In the reign of Edward VI. religious zeal prohibited all intereſt. The ſtatute of Henry VIII. was revived by the 13th of Elizabeth, cap. 8. and 10 *per cent.* continued the legal rate of intereſt till the 21ſt of James I., when it was reſtricted to 8 *per cent.* It was reduced to 6 *per cent.* ſoon after the reſtoration, and by the 12th of Ann. ſtat. 2. cap. 16. it was brought down to 5 *per cent.* yearly, which is now the greateſt legal intereſt that can be taken. But yet, if a contract which carries intereſt be made in a foreign country, our courts will direct the payment of intereſt according to the law of that country, in which the contract was made.

INTEREST, *Intereſſe*, in *Law*, is commonly taken for a chattel real, as a leaſe for years, &c. and more particularly for a future term; in which ſenſe it is ſaid in pleading, that one is poſſeſſed *de intereſſe termini*: therefore an eſtate in lands is better than a right or intereſt in them. But in legal underſtanding, an intereſt extends to eſtates, rights, and titles, that a man hath in or out of lands, &c. ſo as by grant of his whole intereſt in ſuch lands, a reverſion therein, as well as poſſeſſion, in fee-ſimple, ſhall paſs.

INTEREST *on legacies*. In caſe of a veſted legacy, due immediately, and charged on land or money in the funds, which yield an immediate profit, intereſt ſhall be payable thereon from the teſtator's death; but if charged only on the perſonal eſtate, which cannot be immediately got in, it ſhall carry intereſt only from the end of the year, after the death of the teſtator. If a legacy be deviſed, and no certain time of payment mentioned, and the legatee be an infant, he ſhall have intereſt for the legacy from the expiration of one year after the teſtator's death; but if the legatee be of full age, he ſhall have no intereſt but from the time of the demand of the legacy. Where a legacy is payable at a day certain, it muſt be paid with intereſt from that day.

INTEREST, *Punitory*. See PUNITORY.

INTEREST or *no Intereſt*, a denomination applied to inſurances made without having any property on board the ſhips, in which large ſums were inſured. The ſtatute 19 Geo. II. c. 37. enacted that all ſuch inſurances ſhould be null and void. See *Marine* INSURANCE.

INTERESTED WITNESS. See WITNESS.

INTERESTING, in the Suppl. to the folio Encyclopédie, has been made an article for the Beaux Arts, without the leaſt alluſion to muſic. But dull and unintereſting muſic is, perhaps, more tireſome than the ſame degree of inſipidity in painting and poetry. You can quit a picture or a book whenever you pleaſe; but at a public performance of muſic, you have no eſcape from the bad compoſition or performance. A young compoſer, ambitious of fame, and of endearing himſelf to the public, ſhould never write for writing ſake, he ſhould not ſeize his pen without ideas, without a ſubject. There is no art which has more alluring means of obtaining attention. Grace, pathos, fire, fancy, hilarity, rich harmony, and learned modulation, cannot all have admiſſion in the ſame piece; yet it is abſolutely neceſſary that at leaſt ſome one of theſe excellencies ſhould predominate throughout a regular movement. And where a compoſer, not certain of his fertility and powers of pleaſing, has haſtily committed his thoughts to paper, he ſhould ſhut it up in his deſk for at leaſt nine days, if not nine years; at the end of which he ſhould perform it as the production of a ſtranger; then aſk himſelf what *intereſt* he thinks his piece would excite in an intelligent and impartial audience; and if ſelf-love is not the blindeſt of all loves, he will perceive where he is dull, and where genius and abilities are wanting.

INTERFEMINEUM, a word uſed by ſome to expreſs the perinæum.

INTERFERE, in the *Manege*. A horſe interferes, when the ſides of one of his ſhoes ſtrikes againſt and hurts one of the fetlocks. See CUTTING.

INTERJECTION, in *Grammar*, an expreſſion uſed to denote ſome ſudden motion or paſſion of the mind; as *oh! oh!* Theſe exclamations, uttered in a ſtrong and paſſionate manner, are conſidered by ſome writers as the firſt elements or beginnings of ſpeech.

As the greateſt part of the expreſſions uſed on theſe occaſions are taken from nature alone, the real interjections in moſt languages are monoſyllables: and as all nations agree in thoſe natural paſſions, ſo do they agree in the ſigns and indications of them; as of love, mirth, &c.

Some deny the interjections to be words, or any part of ſpeech; and make them mere natural ſigns of the motions or paſſions of the mind, expreſſed by theſe inarticulate ſounds, ſeveral whereof brutes have in common with us: but as theſe are paſſions, and muſt be repreſented in diſcourſe, the interjection has a good foundation in nature, and is a neceſſary part of ſpeech.

Mr. Harris obſerves, that interjections coincide with no part of ſpeech, but are either uttered alone, or elſe thrown into a ſentence, without altering its form, either in ſyntax or ſignification; and that they are not ſo properly parts of ſpeech, as adventitious ſounds; certain voices of nature, rather than voices of art, expreſſing thoſe paſſions and natural emotions, which ſpontaneouſly ariſe in the human ſoul, upon the view or narration of intereſting events. Hermes, p. 285.

Mr. H. Tooke, in his "Diverſions of Purley," excludes interjections from the parts of ſpeech; and aſſerts, that "the dominion of ſpeech is erected upon the downfall of interjections." See GRAMMAR.

The Greeks confound their interjections with adverbs, and the Hebrews confound them with their adverbs and prepoſitions: calling them all by the general name particle.

INTERIM, a term borrowed from the Latin, ſignifying *in the mean time.* It was firſt brought into popular uſe by Charles V. in 1548, in order to compoſe the diſturbances of Germany.

The interim of that prince was a kind of ordinance, or regulation, to be obſerved in the empire with regard to the articles of religion then controverted, till ſuch time as they ſhould be determined by a council; and therefore was called interim.

When it was laid before the diet, the archbiſhop of Mentz, preſident of the electoral college, thanked the emperor for his unwearied endeavours to reſtore peace to the church, and in the name of the diet, ſignified their approbation of the ſyſtem of doctrine which he had prepared, together with their reſolution of conforming to it in every particular. Although the whole diet was amazed at a declaration ſo unprecedented and unconſtitutional, as well as at the preſumption of the archbiſhop, in pretending to deliver the ſenſe of the diet, on a point which had not been the ſubject of conſultation or debate; none had the courage to contradict what he had ſaid. The emperor held the archbiſhop's declaration to be a full conſtitutional ratification of the interim, and prepared to enforce the obſervance of it, as a decree of the empire.

It was ſaid to have been drawn up by two Catholics and a Proteſtant; but as it retained moſt of the doctrines and ceremonies of the Romaniſts, though expreſſed for the moſt part in the ſofteſt words, or in ſcriptural phraſes, or in terms of ſtudied ambiguity, excepting that of marriage, which was allowed to prieſts, and communion, which was adminiſtered to the laity under both kinds, moſt of the Proteſtants rejected it. Thoſe who admitted it were nick-named Interimiſts, or Adiaphoriſts. Indeed the interim equally diſguſted the generality of both parties, the Proteſtants and Catholics.

Beſides this, there were two other interims made: the one called the interim of Leipſic, the other by the divines of Franconia, who, refuſing to accept the two former, made another for themſelves.

INTERIOR. See Internal.

Interior *Figure, Angle of.* See Angle.

Interior *Polygon.* See Polygon.

Interior *Talus.* See Talus.

INTERLACKEN, in *Geography*, a town of Switzerland, and capital of a conſiderable bailiwick, in the canton of Berne: deriving its name from an abbey, ſituated between the lakes of Brientz and Thun, and ſecularized in the year 1528; 32 miles S.E. of Berne.

INTERLINEATION, ſomething inſerted between two lines. See Deed.

INTERLOCUTORY Decree. In a ſuit in equity, if any matter of fact be ſtrongly controverted, the fact is uſually directed to be tried at the bar of the court of king's bench, or at the aſſizes upon a feigned iſſue. If a queſtion of mere law ariſes in the courſe of a cauſe, it is the practice of the court of chancery to refer it to the opinion of the judges of the court of king's bench, upon a caſe ſtated for that purpoſe.

In ſuch caſes interlocutory decrees or orders are made. See Decrees.

Interlocutory *Judgments* are ſuch as are given in the middle of a cauſe, upon ſome plea, proceeding on default, which is only intermediate, and does not finally determine or complete the ſuit. But the interlocutory judgments moſt uſually ſpoken of, are thoſe incomplete judgments, whereby the right of the plaintiff is eſtabliſhed, but the *quantum* of damages ſuſtained by him is not aſcertained, which is the province of a jury. In ſuch a caſe, a writ of inquiry iſſues to the ſheriff, who ſummons a jury, enquires of the damages, and returns to the court the inquiſition ſo taken, whereupon the plaintiff's attorney taxes coſts, and ſigns final judgment. See Judgment.

Interlocutory *Order,* that which decides not the cauſe, but only ſettles ſome intervening matter relating to the cauſe.

As, where an order is made in chancery for the plaintiff to have an injunction to quit poſſeſſion till the hearing of the cauſe; this order, not being final, is called interlocutory.

INTERLOPERS are properly thoſe, who, without due authority, hinder the trade of a company, or corporation lawfully eſtabliſhed, by dealing in the ſame way.

INTERLOPING, the intercepting or diſturbing the traffic of a company; or the taking up a new trade, or the employment, to the prejudice of thoſe who were brought up in it.

INTERLUCATION, in *Huſbandry*, the thinning of a wood, or letting in light between, by lopping or cutting away boughs.

INTERLUDE, an entertainment exhibited on the theatre between the acts of a play, to amuſe the ſpectators while the actors take breath, and ſhift their dreſs; or to give time for changing the ſcenes and decorations.

In the ancient tragedy, the chorus ſung the interludes, to ſhew the intervals between the acts.

Interludes, among us, uſually conſiſt of ſongs, dances, feats of activity, concerts of muſic, &c.

Ariſtotle and Horace give it for a rule, that the interludes ſhould conſiſt of ſongs built on the principal parts of the drama; but ſince the chorus has been laid down, dancers, buffoons, &c. ordinarily furniſh the interludes.

INTERMEDIATE, is uſually underſtood of the ſpace of time elapſed from any certain point to any other.

In *Chemiſtry*, thoſe ſubſtances are called intermediate, by means of which, other ſubſtances, incapable of uniting together of themſelves, may be united.

INTERMEWING, in *Falconry*, is a hawk's mewing, from the firſt change of her coat till ſhe turn white.

INTERMEZZO, *Ital.* Intermede, *Fr.*, a piece of muſic, a dance, or a ſhort dramatic ſcene, generally between two performers of different ſexes, exhibited between the acts of a ſerious opera, to vary the entertainment, and to relieve and enliven the audience, that may be too much oppreſſed and diſpirited by tragic ſcenes of great intereſt.

The ancient Romans had ſatires performed between the acts of their regular comedies; and theſe were afterwards exhibited as farces at the end of pious pieces.

Tragicomedies had a very early admiſſion on the ſtage at Bologna during the 17th century: as Andromeda, Tragicomedia, ſet by Girolamo Giacobbi, maeſtro di cappella of San Petronio, and founder of the Academy de' Filomaſi, in that city, was performed in 1610; and Amor vuol Gioventa, ſchirzo dramatico, at Viterbo, 1659. Muſica di Giambatiſta Mariani, 1659. But the only real burlettas which we have met with are Girello, Drama Burleſca, ſet by the famous Piſtocchi, 1672, which was repreſented at Venice by little figures of wax: I dos Diogeno, dramma burleſca per muſica, and Agripina in Baja, Schirzo drammatico per muſica, were both performed at Ferrara, 1687.

There are intermezzi, ſays Rouſſeau, that are true comic or burleſque dramas, which detach the audience from the intereſt of the principal piece, without taſte or reaſon. As the dance in Italy is never analogous to the drama, they are obliged to admit it on the ſtage as an intermezzo; "but this is not what I blame; on the contrary, I think it may be uſeful to efface, by an agreeable dance, the melancholy impreſſions left by the events of a grand ſerious opera; and I ſee plainly that the ſubject of this dance ſhould have no connection with the piece; but what offends me, continues the citizen of Geneva, is that they deſtroy all the intereſt that has been excited, and render each act a new piece." We ſuppoſe he means that the ballet ſhould be given at the end, not in the middle of the opera.

INTERMITTENT, a thing which ceaſes its action for ſome time; which time is called the *interval.*

Intermittent, in *Medicine*, any animal motion or action, which ceaſes and returns at intervals. The period of ceſſation is termed the *interval*, or *intermiſſion.*

Thus thoſe fevers which, after continuing ſeveral hours, altogether go off, and again return at certain intervals, as of one, two, or three days, are called *intermittent* fevers, in contradiſtinction from thoſe which go through their courſe with little variation, or with regular diminution and aggravation only; the former being called *continued*, the latter *remittent* fevers. See Fever and Ague.

Various other diſorders, beſides the acute fevers juſt mentioned, put on the *intermittent* form; ſuch as head-ache, eſpecially the *hemicrania*, or head-ache of one ſide of the head, the *megrim*, and ſometimes the *tic douleureux*; and pains, ſeated in various other parts of the body, as in the liver, bladder, uterus, &c. It is extraordinary, and does not eaſily admit of any explanation, that, in parts of the body, ſuffering ſevere organic diſeaſe, and actually much injured in their ſtructure, the pain connected with this diſorder ſometimes becomes regularly *intermittent* with intervals of abſolute freedom from the diſtreſs; while of courſe no variation can have occurred in the morbid ſtructure. Such intermiſſions we have witneſſed in cancerous and ulcerated conditions of the womb; and, in ſuppuration in the brain. But, indeed, it is equally difficult to account for the fact in all inſtances; and no ſpeculations have yet enabled us to explain, why the veſſels of any part, (as of the ſupra-orbital notch, in the caſe of *megrim*,) or of the whole ſyſtem, (as in *ague*,) ſhould take on an extraordinary action at regular but diſtant periods, and continue only their ordinary action in the intervals: whether the parts be actually diſeaſed in ſtructure or not, the periodical recurrence and ceſſation of increaſed vaſcular action is equally inexplicable. Dr. Darwin has ingeniouſly endeavoured to refer theſe periodical changes to the influence of our diurnal habits, in regard to activity and ſleep, exhauſtion of ſenſorial power and invigoration, and to the diurnal periods of heat and cold, light and darkneſs, &c. upon all the actions of our frame. That theſe circumſtances greatly influence the operations of the animal body, cannot be doubted: and were all the periods of action and intermiſſion *diurnal* only, we might admit the generalization as correct. But it is not eaſy to diſcover how the very frequent *intermiſſions* of diſeaſe, which continue for *tertian* periods, that is, during an interval of forty-eight hours, and ſtill more thoſe which continue for *quartan* periods, of ſeventy-two hours, can be referred to this general law. See Darwin, Zoonomia, vol. i. ſect. 36.

The bark of the cinchona, and ſome other bitter vegetable ſubſtances, it is well known, poſſeſs a conſiderable degree of power, when adminiſtered during the intermiſſions, for preventing the recurrence of diſeaſes of this claſs. But a remedy has been added to the liſt of the materia medica, which ſeems to have a ſpecific virtue of arreſting all *intermittent* affections: we mean the *arſenic*, which had long been uſed as an empiric noſtrum, under the appellation of the "taſteleſs ague-drop," but which was firſt prepared in a ſafe and manageable form by the late Dr. Fowler, of York, and is now introduced into the pharmacopeia of the College of Phyſicians of London. This medicine has not only been adminiſtered with decided benefit in intermittent fevers; but alſo in the intermittent head-ache and *megrim*, with the moſt marked ſucceſs. And we have found it, in more inſtances than one, ſpeedily arreſt the intermitting pains in diſeaſed uterus, and other organic painful diſeaſes. In a word, arſenic appears to have a ſpecific remedial power over periodical diſorders. But in caſes of organic diſeaſe, its influence is of courſe confined to the periodic pains connected with them, and is not exerted upon the fixed and continued affection.

The term *intermittent* is alſo applied to the *pulſe*, when, after an indefinite number of beats, it ſtops during the time of one pulſation, or loſes a ſtroke. This is ſometimes a formidable ſymptom, when connected with other ſigns of affection of the brain, or of the heart itſelf; but it is more commonly of minor import, being connected with indigeſtion, and a general irritability of the ſyſtem, and is removable by correcting the ſtate of the ſtomach and other organs concerned in the chylopoetic proceſs. See Pulse.

INTERMITTING Springs, in *Natural Hiſtory*, or ebbing and flowing wells, are phenomena which attracted a great deal of attention in former times, and ſeveral works on natural philoſophy contain explanations of the principles on which they might, by a proper application of the ſyphon, be made, by art, ſo as afterwards to be ſelf-acting: it can ſcarcely be doubted but ſome of the intermitting ſprings were natural, or produced their ebbing and flowing or intermiſſion, without the aſſiſtance of art, perhaps that on the N.N.W. ſide of Tideſwell town in Derbyſhire, which formerly exiſted and gave the name to the town, may have been of this number; and perhaps alſo Laywell ſprings at Brixham, in Devonſhire, may have been natural; but Mr. Farey, in his recent Report on Derbyſhire, (vol. i. p. 288.) ſtates the ebbing well at Barmoor, between Caſtleton and Chapel-en-le-Frith, on the ſkirt of Peak foreſt, in Derbyſhire, to occupy the ſcite of an old ſtone-quarry, in the firſt limeſtone rock, and to be evidently the work of art; he alſo mentions an artificial well of this kind lately made in the pariſh of Chapel-en-le-Frith. See Spring.

INTERNAL Angles, are all angles made by the ſides of any right-lined figure within.

In a triangle, as KLM (*Plate* VIII. *Geometry*, *fig.* 103.) the angles L and M are particularly called *internal* and *oppoſite*, in reſpect of the external angle IKM, which is equal to them both. See *Internal* Angles.

Internal *Angle*, is alſo applied to the two angles formed between two parallels, by a line interſecting thoſe parallels, on each ſide the interſecting line.

Such are the angles z and y, and x and s (*Plate* VIII. *Geometry*, *fig.* 104.) formed between the parallels OP and QR, on each ſide of the interſecting line ST.

The two internal angles are always equal to two right angles.

Internal and *Oppoſite Angles*, are alſo applied to the two angles z and x, formed by a line cutting two parallels.

Theſe are reſpectively equal to A and u, called the external and oppoſite angles.

Internal *Affection*, *Denomination*, *Ear*, *Modes*, *Orthography*, *Place*, *Senſe*. See the ſubſtantives.

Internal *Plans*, in *Mining*, ſignify, according to M. Werner (New Theory of Veins, Tranſl. p. 104.), the internal drawings, or ſections as they are called in this country, of the mines and the ſtrata, or of rocks in which they occur. Sections of particular diſtricts, formed into tablets inlaid with the principal rocks and minerals of ſuch diſtricts, have long been made by Mr. White Watſon of Bakewell, in Derbyſhire, Mr. Elias Hall of Caſtleton, Brown and Co. of Derby, and others, but it has juſtly been objected to all the tablets or ſections of this kind which we have ſeen, that they repreſent ſome imaginary hill or mountain, inſtead of being in any way proportioned to, or made to repreſent, the actual ſtrata and outline of any diſtrict. Now that mineral ſurveying, or the methods of obtaining a knowledge of the interior of ſtratified diſtricts, as well as of aſcertaining whether they are ſo ſtratified, has been fully explained in the Report to the Board of Agriculture on the County of Derby, by Mr. John Farey, ſenior, and illuſtrated by a ſurvey of that intereſting and difficult county, we hope that the making of accurate and natural repreſentations or tablets of the interior, or ſections of different diſtricts, will be attempted. A very neat and intereſting way of diſpoſing a tablet of a gentleman's mineral ſtrata in his eſtate, is in the front of his chimney-piece, inſtead of the flat or carved marble ſlab now generally uſed. Mr. William Milnes of the Butts in Aſhover, in Derbyſhire, has employed Mr. W. Watſon to make him ſuch a chimney-piece, which forms a very intereſting object as well as a ſubject of contemplation to his friends and viſitors.

INTERNODIUM, in *Anatomy*, the ſpace between two articulations. It is only applied to the fingers, where it is employed in naming ſome of the muſcles; at preſent it is uſed only in the extenſors of the thumb, which are called extenſor primi, and ſecundi internodii pollicis.

INTERNODIUM, in *Botany*, the ſpace that is between two knots, or joints, of the ſtalk of a plant; *e. gr.* of the ſtalk or ſtraw of wheat, or other corn.

INTERNUS MALLEI, in *Anatomy*, one of the muſcles of the oſſicula auditus, called more commonly tenſor tympani. See EAR.

INTEROSSEI, a number of ſmall muſcles of the hands and feet, ſo named from being ſituated in the intervals of the metacarpal and metatarſal bones.

The *interoſſei* of the hand are ſeven; *viz.* two for each of the three middle fingers, and one for the little finger. The abductors and the adductor of the thumb ſupply the places of the interoſſei in that member; and the adductor oſſis metacarpi indicis holds the place of an internal interoſſeous muſcle in the little finger. The interoſſei produce the lateral motions of the fingers to which they correſpond; they may therefore be moſt conveniently arranged as abductors and adductors of their reſpective fingers. More commonly, however, they are divided into two claſſes, according as they are placed towards the palm or the back of the hand, and diſtinguiſhed by the names of interoſſei interni priores or palmares, and externi poſteriores or dorſales. In this diſtribution, the internal claſs contains four muſcles, which are named by Albinus, 1, indicis prior, and 2, poſterior; 3, prior annularis; 4, prior auricularis; the external has only three; *viz.* 1 and 2, prior et poſterior digiti medii; 3, poſterior annularis. Sometimes they are diſtinguiſhed numerically, beginning from the thumb. The abductor indicis, or ſemi-interoſſeus, (ſee ABDUCTOR,) forms the firſt external interoſſeus of Soemmerring; who therefore enumerates four external interoſſei. This anatomiſt makes only three internal interoſſei; the 1ſt, internal interoſſeus of Albinus, being one of the heads of Soemmerring's firſt external interoſſeus. Both claſſes are called by ſome French writers metacarpo-ſus-phalangiens.

Interoſſei of the fore-finger. The abductor (prior indicis of Albinus, one of the heads of the firſt external interoſſeus of Soemmerring and others) is attached to the radial flat ſurface of the metacarpal bone of the fore-finger; it forms a tendon towards the finger, which is inſerted, in common with that of the abductor indicis, into the radial ſide of the metacarpal end of the firſt phalanx of that finger, having alſo a ſlight connection to the extenſor tendon; the radial artery dips into the palm of the hand between this muſcle and the abductor indicis.

The adductor of the fore-finger (poſterior indicis, Alb.) is placed towards the palm of the hand. It ariſes from the ulnar flat ſurface of the 2d metacarpal bone, and from the ligaments which unite that to the trapezoid bone. At the end of the metacarpus it forms a ſmall flat tendon, paſſes over the articulation of the index and metacarpus, the ſide and back part of the firſt phalanx, the articulation between the firſt and ſecond phalanges, and the dorſal ſurface of the 2d phalanx. On the middle of the latter bone, it meets at an acute angle with a correſponding tendon of the lumbricalis, and the two tendons unite into a broader one, which is ſlightly contracted and inſerted into the middle prominence of the back of the third phalanx. About the middle of the firſt phalanx, or rather ſooner, it becomes united to the broad tendon of the extenſor, from which it ſeparates a little before the termination of that tendon.

This connection is formed by a thin and broad tendinous expanſion, which cloſely covers the articulation of the index with the metacarpus.

Interoſſei of the middle finger. The abductor (prior digiti medii) is placed towards the back of the hand: it ariſes from the ulnar ſide of the ſecond, and radial ſide of the third metacarpal bone; and has a middle tendon, in which two oblique rows of fibres terminate. The courſe of its tendon correſponds exactly to that of the preceding, and is united, at its termination, to that of the ſucceeding muſcle.

The adductor of the middle finger (poſterior medii digiti) is placed alſo towards the back of the hand, and has a ſimilar form to the laſt muſcle. It ariſes from the third and fourth metacarpal bones, and is inſerted in the manner already deſcribed.

Interoſſei of the ring-finger. The abductor, (prior annularis,) placed towards the palm, is attached to the radial ſide of the fourth metacarpal bone, and to the ligaments which connect it to the carpus. It terminates in a tendon ending as already deſcribed. The adductor (poſterior annularis) is placed towards the back of the hand, ariſes from the ulnar ſide of the fourth, and from the radial ſide of the fifth metacarpal bone, and has a middle tendon placed between two planes of fibres, and inſerted like the preceding ones.

The *interoſſeus* of the little finger. This finger has only an abductor (prior auricularis), which ariſes from the radial ſurface of the fifth metacarpal bone, and from the ligaments joining it to the carpus. Its tendon has a courſe and inſertion like thoſe of the former.

The expanſions of the interoſſei, where their tendons begin to join thoſe of the extenſors, are connected by many fibres to the capſules of the joints formed between the metacarpal bones and the firſt phalanges: their aponeuroſes are alſo ſtrengthened by the tendons of the lumbricales. The relations of the interoſſei to the ſurrounding parts may be conſidered in a general view. On the ſides they correſpond to the metacarpal bones, and they are reciprocally in contact with each other. They are covered in front by the tendons of the flexor profundus, by the lumbricales, and, ſo far as the three firſt are concerned, by the adductor pollicis. They are retained, towards the end of the metacarpus, by the anterior tranſverſe palmar ligament, at the level of which they are all directed backwards. On the poſterior ſurface the firſt interoſſeus is ſubcutaneous: the others are covered by thin aponeuroſes attached to the correſponding metacarpal bones, ſeparating the interoſſei from the extenſor tendons, and in their intervals from the integuments. Their expanded tendons are placed between the phalanges and the ſkin.

Theſe muſcles ſeem to perform, as their primary uſe, the abduction and adduction of the fingers. They ſerve to fix the extenſor tendons; which, not being covered by any fibrous ſheaths, required this lateral ſupport. They partake this office with the lumbricales; when the two interoſſei of any finger act together, the extenſor tendon is drawn in the diagonal of their direction. If the fingers are extended, they will be fixed more firmly in this poſition; but if they are already bent, the flexion is increaſed by the action of the interoſſei, which exert themſelves ſo much the more effectually, as their tendon falls perpendicularly in the moving part. From the courſe which the tendons purſue, along the ſides to the backs of the fingers, they will have the effect of extending the middle and laſt joints. If the fingers are fixed, theſe muſcles may bend the metacarpus to them.

The *interoſſei* of the foot hold the ſame relation to the metatarſus, as thoſe of the hand do to the metacarpus; and are arranged into an internal and an external claſs, or a ſuperior and an inferior; of which the former is placed towards the back, and the latter towards the ſole of the foot. They are the adductors and abductors of the toes; and are ſeven in number, three internal, and four external. Of theſe, ſix belong to the three middle toes, and one to the little toe, their place being ſupplied, in the great toes, by its proper muſcles.

The *internal interoſſei* are the adductors of the third, fourth, and fifth toes. They agree very nearly in their mode of origin, figure, courſe, termination, and action. They are ſmall and tendinous at their commencement; grow gradually thicker and broader, then again decreaſe, and form long and flat tendons at the digital end of the metacarpus. They all paſs forwards from the metatarſus towards the toes, and end at the tibial ſides of the metacarpal extremities of their reſpective toes, near the terminations of the lumbricales. Their tendons are cloſely connected to the capſules of the firſt joints of the toes, to thoſe of the lumbricales, and of the extenſors. The firſt ariſes from the poſterior part of the under ſurface of the third metatarſal bone on its tibial ſide: the ſecond from the correſponding part of the fourth, and the third from that of the fifth metatarſal bone. The two latter are alſo connected to the ſheath which contains the tendon of the peroneus longus.

The *external interoſſei* are 1 and 2, the adductor and abductor of the ſecond toe, 3, the abductor of the third, and 4, the abductor of the fourth. The three latter reſemble each other, and reſemble alſo the external interoſſei of the hand, in having double origins: each of them has two heads, ariſing from the two contiguous metatarſal bones, tendinous at their commencement, uniting at acute angles in a middle tendon, which paſſes forwards to the toes. The tendons are thicker and broader than thoſe of the internal interoſſei, connected in the ſame way to the capſules of the firſt joints, and inſerted in the ſame manner, but on the oppoſite ſides of the firſt phalanges. The abductor of the ſecond toe has its larger origin from rather more than the poſterior half of the third metatarſal bone, on its outer or peroneal ſurface; the ſmaller head comes from the oppoſed ſurface of the ſecond bone. The abductor of the third toe has a larger origin from the fourth, and a ſmaller from the third bone; and the abductor of the fourth has the ſame relation in its origin to the fifth and fourth metatarſal bones. The adductor of the ſecond toe differs from the other external or ſuperior interoſſei, in ariſing from one bone only: its origin is derived from more than the poſterior half of the inner or tibial ſurface of the ſecond metatarſal bone: its inſertion is ſimilar to that of the others.

The interoſſei of the foot have the following relations to the ſurrounding parts: On the back of the foot they are covered by the tendons of the two extenſors, and by a very thin aponeuroſis, which is ſometimes ſcarcely ſenſible, and which is extended in the intervals of the metatarſal bones. In the ſole they are in contact with the muſcles of the great and of the little toe, with the tendons of the flexor longus digitorum and the lumbricales, and with the deepſeated plantar veſſels. On their ſides they correſpond to each other, or to the metatarſal bones.

The motions produced by theſe muſcles are analogous to thoſe of the correſponding ones in the hand. In the firſt place they are adductors and abductors of their reſpective toes. They may act as flexors of the firſt phalanges through the means of their tendons affixed to theſe bones, more particularly when the firſt joints are already ſlightly bent; for they are then directed obliquely or perpendicularly to the moveable point, with which, in the extended ſtate, they are parallel. By the portions, which they detach to the extenſor tendons, they may aſſiſt the extenſion of the laſt phalanges; but it is neceſſary that the extenſors ſhould have previouſly acted in ſome degree, to carry the laſt phalanx upwards and backwards, and this motion is then increaſed by the interoſſei. They ſerve alſo, as in the hand, to fix the extenſor tendons laterally.

INTEROSSEUS, an epithet of certain organs of the body, particularly in the fore-arm and leg, which are ſituated between two bones. The interoſſeous artery of the fore-arm is a branch of the ulnar, and is divided into an anterior and a poſterior interoſſeous branch. In the leg, the peroneal artery is ſometimes deſignated by this term. The interoſſeous ligaments are aponeurotic expanſions attached to the oppoſed edges of the bones of the arm and leg, and filling up the intervals between theſe bones. See ARTERY and EXTREMITIES.

INTERPLEADER, *Bill of*, in *Law*, is where a perſon who owes a debt or rent to one of the parties in a chancery ſuit, but, till the determination of it, he knows not to which, deſires that they may interplead, that he may be ſafe in the payment. In this laſt caſe it is uſual to order the money to be paid into court, for the benefit of ſuch of the parties to whom, upon hearing, the court ſhall decree it to be due. But this depends upon circumſtances; and the plaintiff muſt alſo annex an affidavit to his bill, ſwearing that he does not collude with either of the parties.

INTERPOLATION, a term uſed by critics in ſpeaking of ancient writings and manuſcripts, in which ſome ſpurious additions or alterations have been ſince made.

To eſtabliſh or aſcertain an interpolation, P. Ruinart gives us the five following rules. 1. That the piece ſuppoſed to be interpolated appear to have all the antiquity it pretends to. 2. That there be good proofs that it has been interpolated. 3. That the ſuppoſed interpolations agree to the time of the interpolator. 4. That the interpolations do not touch the foundation of the work; and that they be not too frequent, nor entirely disfigure the piece. 5. That the reſtitution made, agree perfectly to the reſt of the work.

Interpolations have occaſioned ſeveral of the various readings in the New Teſtament. Michaelis, in his "Introduction to the New Teſtament," and alſo other writers, have ſuggeſted how theſe were introduced, and how they may be diſtinguiſhed from the original text. *E. G.* If for a paſſage that is not abſolutely neceſſary to the conſtruction, various readings are found that differ materially from each other, we have reaſon to ſuſpect its authenticity; and that all the readings are interpolations of tranſcribers, who have attempted by different methods to ſupply the ſeeming deficiency of the original. An interpolation is ſometimes betrayed by the circumſtance of its being delivered in the language of a later church. To this purpoſe Michaelis obſerves, that in the time of the apoſtles the word "Chriſt" was never uſed as the proper name of a perſon, but as an epithet expreſſive of the miniſtry of Jeſus, and was frequently applied as ſynonymous to "Son of God." The expreſſion, therefore, "Chriſt is the Son of God," (Acts, viii. 37.) is a kind of tautology, and is almoſt as abſurd as to ſay Chriſt is the Meſſiah, that is, the Anointed is the Anointed. But the word being uſed in later ages as a proper name, this impropriety was not perceived by the perſon who obtruded the paſſage on the text. If one or more words, that may be conſidered as an addition to a paſſage, are found only in MSS., but in none of the moſt ancient verſions, nor in the quotations of the early fathers, we have reaſon to ſuſpect an interpolation. Acts, viii. 39. πνευμα [αγιον επεπεσεν επι τον ευνȣχον, αγγελος δε] Κυριȣ ηρπασε τον φιλιππον, is an inſtance of this kind, where the words between the crotchets are probably ſpurious. Interpolations of conſiderable length are occaſioned ſometimes in the following manner: The owner of a MS. makes a note in the margin, either explanatory of ſome narrative in the text, or containing an account of ſome event that was handed down by tradition; which MS., being afterwards tranſcribed, the copyiſt writes text and notes without diſtinction in the body of his work. "I am perſuaded," ſays Michaelis, "that John, v. 4., a very ſuſpicious paſſage, and omitted in a very great number of MSS. has been intruded in this manner into our preſent text, and that this ſcholion was written originally not in Greek, but in ſome oriental language." The diſputed paſſage in 1 John, v. 7. may probably be a ſpecimen of this kind of interpolation. Its ſpuriouſneſs has been ſhewn by ſir Iſaac Newton, in a letter to Le Clerc, firſt publiſhed in London in 1754, and more correctly by Dr. Horſley in 1785, from the author's origin al copy. (See his edition of Newton's Works, vol. v. p. 495—531.) This letter, ſays Dr. Marſh, is leſs known than it deſerves, as the immortal author has diſplayed in it as much critical knowledge, as penetration in his mathematical inquiries. The queſtion has been likewiſe examined, and with great impartiality, by Bengel, in his "Apparatus Criticus," p. 458—482. 2d ed.; and the diſpute has been ſatisfactorily terminated by the eminently learned Porſon, in his "Letters to Travis," publiſhed in 1791. See *Various* Readings.

Interpolation, in *Algebra*, is uſed for the finding an intermediate term of a ſeries, its place in the ſeries being given; and the method of doing this is called the *method of interpolations*.

When the algebraic equation of the ſeries is given, the term required, whether it be a primary or intermediate term, may be found by the reſolution of affected equations; but when this equation is not given, as it often happens, the value of the term ſought muſt be exhibited by a converging ſeries, or by the quadrature of curves.

When the firſt, ſecond, and other ſucceſſive differences of the terms of a ſeries become at laſt equal, the interpolation of any term of ſuch a ſeries may be found by ſir Iſaac Newton's differential method.

The method of interpolation was firſt invented by Mr. Briggs, Savilian profeſſor of Geometry at Oxford, and applied by him to the calculation of logarithms. His principles were followed by Dr. Wallis, who made ſeveral ingenious applications of this theory; and by Reginald and Mouton, in France. Sir Iſaac Newton, in lemma 5. lib. iii. Phil. Princip. Mathem. gave a moſt elegant ſolution of the problem for drawing a curve line through the extremities of any number of given ordinates; and in the ſubſequent propoſition applied the ſolution of this problem to that of finding from certain obſerved places of a comet, the place of it at any given intermediate time. Dr. Waring, who adds, that a ſolution ſtill more elegant, on ſome accounts, has been ſince diſcovered by Meſſrs. Nicholi and Stirling, has alſo reſolved the ſame problem, and rendered it more general, without having recourſe to finding the ſucceſſive differences.

The theory of interpolation is of very extenſive uſe, not only in pure analyſes and geometry, but in various other ſubjects of mathematical inquiry and computation, and particularly in aſtronomy; we ſhall therefore endeavour to explain the principles upon which it is founded, and ſhew its application in a few caſes to practical operations.

Firſt, then, let a, b, c, d, e, f, &c. repreſent any ſeries of ſimilar quantities, and let the difference between the firſt and ſecond, the ſecond and third, the third and fourth, &c. terms, be taken; and theſe ſeveral remainders will form what is called the firſt order of difference; then again, let the differences of theſe differences be taken in the ſame way; and the differences of theſe laſt again the ſame, and ſo on, which will give the following reſult, obſerving, that for the convenience of exhibiting the operation, we have only retained the firſt remainders in each ſucceſſive ſubtraction.

ſeries	$a \quad b \quad c \quad d \quad e \quad f$, &c.
1ſt diff.	$a - b$
2d diff.	$a - 2b + c$
3d diff.	$a - 3b + 3c - d$
4th diff.	$a - 4b + 6c - 4d + e$
5th diff.	$a - 5b + 10c - 10d + 5e - f$
6th diff.	$a - 6b + 15c - 20d + 15e - 6f + g$
	&c. &c. &c.

Now the co-efficients of theſe terms are reſpectively the ſame as thoſe of the co-efficients of the binomial, and the order of their generation evidently follows the ſame law, and therefore we may conclude with equal certainty, that the nth difference of any ſeries of quantities will be expreſſed by the formula

$$a - nb + \frac{n(n-1)}{1.2}c - \frac{n(n-1)(n-2)}{1.2.3}d$$
$$+ \frac{n(n-1)(n-2)(n-3)}{1.2.3.4}e - \text{\&c.}$$

Now it is obvious, that if the given quantities be ſuch, that any order of their differences become equal to 0, that any one of thoſe quantities may be accurately expreſſed in functions of the others; thus, for example, ſuppoſe the fourth difference to become zero, that is

$$a - 4b + 6c - 4d + e = 0$$

then will $$c = \frac{-a + 4b + 4d - e}{6}$$

and it is obvious that any other of theſe quantities might be expreſſed in a ſimilar manner; and therefore, if all thoſe quantities but one be known, that one may be aſcertained. Thus, by way of illuſtration, ſuppoſe we had the three ſquares $10^2 = 100$, $8^2 = 64$, and $7^2 = 4$, and the ſquare of 9 was required; ſince the third differences of ſquares equal 0, we ſhould have $9^2 = \frac{100 + 3 \cdot 64 - 49}{3} = 81$, and the ſame is obviouſly true of any terms of which the differences vaniſh.

But if the differences do not vaniſh, then any intermediate term found by this method only approximate towards the true reſult, which is however ſufficiently correct in a number of caſes; thus, in finding any logarithm, of which thoſe conſecutive to it are given, the above formulæ may be ſucceſsfully employed; for though, in fact, the differences of logarithm never become zero, yet their fourth differences are ſo ſmall, that by conſidering them as 0, the error will not effect the truth of the reſult to 8 or 9 places of decimals.

Exam.—Given the logarithms of 101, 102, 104, 105, to find the logarithm of 103.

Here, calling the log. of $101 = a$, of $102 = h$, $103 = c$, $104 = d$, and $105 = e$; and conſidering the fourth differences of theſe $\text{logs} = 0$; we ſhall have from the formula

$$a - 4b + 6c - 4d + e = 0$$

$$c = \frac{4(b + d) - (a + e)}{6}$$

Hence the following computation:

$$\begin{array}{lrl}
\text{log. } 101 = & 2.0043214 & = a \\
\text{log. } 102 = & 2.0086002 & = b \\
\text{log. } 104 = & 2.0170333 & = a \\
\text{log. } 105 = & 2.0211893 & = e \\
\hline
 & 4.0256335 & = b + d \\
 & 4 & \\
\hline
 & 16.1025340 & = 4(b + d) \\
\text{ſubtr.} & 4.0255107 & = a + e \\
\hline
 & 6)12.0770233 & \\
\hline
\text{log. } 103 = & 2.0128372 & \text{as required.} \\
\hline
\end{array}$$

This method of finding the intermediate logarithms between others that are known, though of little importance in the preſent ſtate of the ſciences, was of very eſſential ſervice to the original computers; and to whom the invention of it is due, or more properly to Briggs alone, who ſeems to have been the firſt that entered upon the inveſtigation of this theory.

This doctrine is applied with great ſucceſs in various aſtronomical operations, and is the means of ſaving in many caſes immenſe laborious calculations. Thus, for example, in finding the places of ſome of the planets, whoſe motion is not very rapid, it will be ſufficiently accurate to find their places by calculation for every fourth or fifth day, and then by means of the method above deſcribed, their places for all the intermediate days may be found by interpolating between the known terms, which method will give a reſult much nearer the truth, than by proportional parts, becauſe this ſuppoſes a uniformity both in motion and time, which is not correct.

Again, in computing the moon's place for any particular hour, ſuppoſing its place for every day at noon to be given, the method of interpolations may be applied with great ſucceſs, the reſults having ſcarcely any ſenſible difference from thoſe that ariſe from actual computation, and we may thus frequently avoid one of the moſt laborious of aſtronomical calculations.

By this means alſo, the place of a comet at any particular time may be aſcertained, from obſervations made on it prior to, and ſubſequent to, that preciſe period, as alſo the times of the equinoxes and ſolſtices, which are determined much more accurately by this method than can be done by proportional parts, for in this, we are obliged to ſuppoſe that the ſun's declinations increaſe and decreaſe proportionally to the diſtance of this body from the equinoctial point; which is evidently a falſe hypotheſis. In fact, aſtronomy has derived more aſſiſtance from this theory than any other of the mathematical ſciences, although it has been applied to other purpoſes with very great ſucceſs; but in order to render its application thus general, a much more accurate and extended inveſtigation of the theory than that which has been at preſent mentioned becomes neceſſary, and of which we propoſe to give a ſlight view in the ſubſequent part of this article.

The general problem to be reſolved in all theſe caſes is this. Having given two ſeries of numbers, which correſpond with one another, according to a certain law, and of which one may be called the ſeries of roots, and the other the ſeries of functions, to find an intermediate number, between two functions, which ſhall anſwer or correſpond to a given intermediate number between two roots. This problem is treated of in all its generality by Newton, in his "Methodus Differentialis," and by Stirling in his "Tractatus de Summatione, &c.;" ſee alſo Lacailles Aſtronomy, and a paper by Mayer in the Acta. Petrop. tom. ii. page 108; alſo an excellent memoir by Lalande, tranſmitted to the Academy of Sciences of Paris for 1761; in which he has ſhewn that in calculating the moon's place, and much more that of any other of the heavenly bodies, whoſe motions are more regular; it will always be ſufficient to conſider only the third differences, and in many caſes only the ſecond differences will be requiſite, and ſometimes only the firſt; in fact he has ſhewn how, and to what degree of accuracy, the method of interpolation may be employed in moſt caſes. The ſame author has alſo a very complete article on this ſubject in the Encyclopédie Méthodique, where, in explaining the nature of aſtronomical interpolation, he ſays, ſuppoſe a ſeries of numbers 0, 1, 3, 6, 10, 15, 21, &c. of which the differences are unequal, but follow a certain law, being in fact in arithmetical progreſſion as 1, 2, 3, 4, 5, 6, &c. ſo that the ſecond differences are conſtant, and equal to unity. Now if we take the alternate terms of this ſeries, as for inſtance 0, 3, 10, 21, &c. the firſt differences will be 3, 7, 11, &c. and the differences of theſe differences will be conſtant, and equal to 4; that is four times greater than before; becauſe in doubling the interval, we have for the firſt difference the ſum of 1 and 2, and in the other the ſum of 3 and 4; hence it follows that the ſecond difference increaſe in the ratio of the differences between 2 and 3, and 1 and 4: the increaſe, therefore, being equal to three times the firſt, this ſecond difference will be equal to four times that; and if we took every third number, the ſecond difference would be 9, and ſo on.

Thus, in general, the ſecond differences increaſe as the ſquare of the intervals of the numbers; and hence we have the following rule for ſupplying the intermediate terms of a ſeries of numbers of which the law of their generation is uniform.

For example, let there be four numbers which may repreſent longitudes, obſerved at the interval of 12 hours each; and of which the three differences are 78, 222, and 366, ſo that their ſecond differences will be conſtant, and equal to 144; according to the following tablet.

Hours	Nos.	1ſt Diff.	2d Diff.
0	0		
12	78	78	144
24	300	222	144
36	666	366	

Such an example is the moſt ſimple that can be conceived in interpolation, but ſimple as it is, it is all that is required in aſtronomy, even for the motion of the moon, which is the moſt irregular of all the planetary bodies; ſuch at leaſt is the aſſertion of Lalande in the article of the Encyclopédie above quoted.

Now knowing the above numbers, or obſerved longitudes, for every 12 hours, it will be eaſy, by means of the above rule, to find the ſame for every ſix hours; for ſince, in this caſe, the ſecond differences ought to be only one-fourth of thoſe above, that is 36, it will therefore only be neceſſary to conſtruct a ſeries of numbers beginning at 0, whoſe ſecond differences are 36, and whoſe ſecond term ſhall be 78; therefore $\frac{78 - 36}{2} = 21$ is the firſt term of the firſt differences; and all the other terms will be found by adding ſucceſſively to this, the conſtant ſecond difference 36; thus

1ſt diff.		21,	57,	93,	129,	165, 201
Nos. or long.	0.	21,	78,	171,	300,	465, 666.

But if, inſtead of interpolating one term between each of the given numbers, it had been required to interpolate two terms, then we muſt have taken a ninth part of the above ſecond difference, *viz.* 16, and found from hence a ſeries of numbers whoſe ſecond difference ſhould be 16, and the third term of the ſeries = 78. Now in order to find this ſeries, it will be ſufficient to find the firſt term of the 1ſt differences, as all the reſt that is required may be determined from this; ſuppoſe, then, this term to be x, which is alſo the firſt term of the required ſeries, then the ſecond will be $2x + 16$, and the third $3x + 48$; whence $3x + 48 = 78$, or $x = 10$; which gives for

the 1ſt diff.		10,	26,	42,	58,	74,	90,	106, &c.
Nos. or long.	0.	10,	36,	78,	136,	210,	300,	406, &c.

and on ſimilar principles may the interpolation in any other caſe be effected with the ſame degree of eaſe and accuracy; that is, generally, in order to interpolate any number of terms n, between any two given terms of a known ſeries, we muſt divide the ſecond difference of the given ſeries by $(n + 1)^2$, in order to have the ſecond difference of the new ſeries; and then again in order to obtain the 1ſt differences, we have this formulæ; where $d' =$ 1ſt term 1ſt diff. of the given ſeries; and $d'' =$ 2d difference new ſeries,

$$\text{1ſt term 1ſt diff.} = \frac{d'}{n+1} \pm \frac{n\,d''}{2};$$

which may be more conveniently expreſſed in terms of the 1ſt and 2d differences of the given ſeries as follows; $d' =$ 1ſt difference, $d' =$ 2d difference of the given ſeries, then the 1ſt term 1ſt diff. of the new ſeries, becomes

$$= \frac{2\,d'\,(n + 1) \pm n\,d''}{2\,(n + 1)^2},$$

and this term being thus determined, all the others are readily obtained; and conſequently alſo all the intermediate terms which were to be interpolated. The conſideration of ſecond differences, which render the interpolation ſo extremely eaſy, is, as we before obſerved, ſufficiently exact for the greater part of aſtronomical calculations, particularly in the conſtruction of tables; it was thus that Sharp in 1695 calculated his table of right aſcenſion and declination for every degree of latitude and longitude; having firſt calculated *trigonometrically* the ſame for every fifth degree, the other intermediate degrees having been aſcertained by means of the theory of interpolation. Mouton alſo, on ſimilar principles, calculated the declination of the ſun for every minute of longitude in ſeconds and thirds, having firſt found *trigonometrically* the ſame for every degree. In general, whatever be the nature of the calculation, it will be ſufficient to aſcertain rigorouſly by trigonometry, or otherwiſe, terms at ſuch a diſtance that their third differences may become zero, or ſo ſmall that no ſenſible error will ariſe in conſidering them as ſuch, and then all the intermediate terms may be ſupplied by the theory which has been inveſtigated. Lalande has publiſhed in the "Connoiſſance des Tems for 1771," a very commodious table for abridging theſe kind of operations, and there is another ſtill more extended in the "Recueil des Tables de Berlin."

The ſame theory of ſecond differences may alſo be conveniently applied to correct calculations and obſervations, that is, by aſcertaining the uniformity of the remainders or differences.

For example, a ſeries of obſervations being ſubmitted to this teſt, ought to have a certain order of their differences uniform, and if in any place ſuch a uniformity is not obſerved, one difference being greater, or leſs, than another, it may be concluded with certainty, that ſome error has been committed in the correſponding obſervation; the correction of which may be readily made, without repeating the obſervation; Lalande has alſo given, in his memoirs above-mentioned, general formulæ of correction, for all ſuch caſes, and which may be applied with the greateſt facility, and the correction computed to the utmoſt poſſible accuracy.

On nearly the ſame principles as the foregoing, the extraction of roots, as the ſquare root, cube root, &c. may be effected with great eaſe, by knowing certain equidiſtant roots. The application in this caſe being extremely ſimple, it may not be amiſs to enter a little into the explanation of it.

Let then

$$(x^3 + 1)^{\frac{1}{3}} = x + \frac{1}{3x^2} - \frac{1}{9x^5} + \frac{5}{81x^8} - \frac{10}{243x^{11}} + \text{\&c.}$$

$$(x^3 \quad)^{\frac{1}{3}} = x$$

$$(x^3 - 1)^{\frac{1}{3}} = x - \frac{1}{3x^2} - \frac{1}{9x^5} - \frac{5}{81x^8} - \frac{10}{243x^{11}} - \text{\&c.}$$

repreſent the cube roots of any three conſecutive numbers, the differences of which are

$$\text{1ſt diff.} \begin{cases} \frac{1}{3x^2} + \frac{1}{9x^5} + \frac{5}{81x^8} + \frac{10}{243x^{11}} + \text{\&c.} \\ \frac{1}{3x^2} - \frac{1}{9x^5} + \frac{5}{81x^8} - \frac{10}{243x^{11}} + \text{\&c.} \end{cases}$$

$$\text{2d diff.} \qquad \frac{2}{9x^5} + \frac{20}{243x^{11}} + \text{\&c.}$$

In the ſame way, was it neceſſary, we might have found the third and fourth differences, and ſo on; but in the caſe we ſhall ſuppoſe, of $x^2 > 1000$, or $x > 10$, this ſecond difference is ſufficiently exact, and even the ſecond term of this ſecond difference is ſo ſmall, that it may be omitted without affecting even the eleventh place of decimals, for taking $x = 10$, we have $\frac{20}{243\,x^{11}} = \frac{2}{2430000000000}$, which, when converted into a decimal, will not give an effective figure before the 11th place; we may, therefore, without any ſenſible error, call $\frac{2}{9x^5}$ the ſecond difference, which will remain conſtant for ſeveral terms, while our extraction is not carried farther than to eight decimal places. Suppoſing, therefore, the cube root of any two conſecutive numbers greater than 1000 to be known, that is, $\sqrt[3]{x^3-1}$, and $\sqrt[3]{x^3}=x$; the firſt difference is aſcertained by ſimple ſubtraction, and the ſecond difference is found by the formula $\frac{2}{9x^5}$; and with theſe data, we may calculate eight or ten of the ſubſequent roots, when a new computation becomes neceſſary.

This is not, however, the ſimpleſt manner of employing the formulæ that have been deduced, becauſe it requires the knowledge of two conſecutive roots, whereas it will be ſufficient to have the roots of numbers equidiſtant from each other, and by means of which the firſt and ſecond differences may be readily obtained, and the ſucceſſive extractions will thus become ſo many different checks upon each other. Suppoſe, for example, that we know the cube roots of 2000 and 2008; that is, $\sqrt[3]{2000}=a$, and $\sqrt[3]{2008}=b$; and it were required to find the roots of all the intermediate numbers; calling the firſt difference $=d$, and the ſecond difference $=\frac{2}{9a^5}=c$; then the cube roots will ſtand thus:

$$\sqrt[3]{2000}=a$$
$$\sqrt[3]{2001}=a+d$$
$$\sqrt[3]{2002}=a+2d-c$$
$$\sqrt[3]{2003}=a+3d-3c$$
$$\sqrt[3]{2004}=a+4d-6c$$
$$\sqrt[3]{2005}=a+5d-10c$$
$$\sqrt[3]{2006}=a+6d-15c$$
$$\sqrt[3]{2007}=a+7d-21c$$
$$\sqrt[3]{2008}=a+8d-28c=b.$$

And ſince this laſt root ought to be equal to the known root b, we have a ſecure check upon all the preceding part of the operation; or more properly, this condition may be employed for finding the firſt difference d, and the check be made upon the ſubſequent difference; for ſince $a+8d-28c=b$, we have $d=\frac{b+28c-a}{8}$. This operation will be better underſtood from the following work at length.

Given the cube root of 6280 = 18.449582727, and of 6288 = 18.45741356, to find all the intermediate roots between thoſe numbers.

By logarithms we find $\frac{2}{9\sqrt[3]{6280}}=000000105=c$, and hence $\frac{b-a+28c}{8}=.00979222=d$; hence, again, the following operation.

Cube root 6280 = 18.449582727
979222 difference

6281 = 18.450561949
979117 difference

6282 = 18.451541066
979012 difference

6283 = 18.452520078
978907 difference

Cube root 6284 = 18.453498985
978802 difference

6285 = 18.454477787
978697 difference

6286 = 18.455456484
978592 difference

6287 = 18.456435076
978487 difference

6288 = 18.457413563

And thus may the extraction be carried on at pleaſure, by ſimple addition and ſubtraction; the cube roots of certain periodical terms being firſt known: it is unneceſſary to obſerve that the above ſucceſſive differences are found by ſubtracting always .000000105 from the foregoing one.

At preſent we have only conſidered the mere elementary principles on which the theory of interpolation is founded; it will be proper, however, before we conclude this article, to give ſome idea of the general formulæ and reſults obtained from theſe ſimple and obvious truths, by Newton in his "Methodus Differentialis;" and by Stirling, in his tract entitled "Tractatus de Summatione et Interlopatione Serierum Infinitarum," publiſhed in 1730, both of which works are worthy of their celebrated authors.

Let us imagine a right line given in poſition, on which let there be erected any number of ordinates parallel to one another, and at equidiſtances, which ordinates may be conceived to repreſent the terms of a regular ſeries, continually increaſing or decreaſing; and one and the ſame curve will paſs through all their extremities, the equation of which will be determined from the given equation to the ſeries; that is, from the equation expreſſing generally the relation between any two or more ſucceſſive ordinates: and if this equation be finite, the equation of the curve will alſo be finite, and conſequently an abſolute interpolation of the ſeries may be effected; for this is nothing more than aſſigning to every particular abſciſs, its correſponding ordinate, and this will always be the caſe if any order of the differences become equal to zero; thus, in all kinds of figurate numbers, as *triangulars*, *ſquares*, *pentagonals*, &c. the curve paſſing through their ſummits will be the common conical parabola. But if, as is frequently the caſe, no order of differences become zero, then the algebraic equation of the curve cannot be found, and conſequently no interpolation can then be made, except by means of an infinite ſeries, the quadrature of ſome curve, or ſome other approximation.

Let there be propoſed, for example, the ſeries 1, 8, 27, 64, &c. the general interpolation of which is required. This ſeries is no other than that of the natural cubes, and therefore the method that we are about to follow is wholly unneceſſary in this caſe, but the example is choſen in order to illuſtrate the general method, which is applicable in all caſes, even when the terms of the ſeries appear to follow no certain law. We firſt write the terms of the propoſed ſeries in one line, then the differences of theſe in the next, and then again the differences of theſe, and ſo on, till the laſt order of differences become all equal, or ſuch that no ſenſible error will ariſe in conſidering them as ſuch; then conſidering z as any abſciſs, the firſt terms of theſe ſucceſſive differences will be the co-efficients of the ſeries of terms

$$1,\ z,\ \frac{z(z-1)}{1\,.\,2},\ \frac{z(z-1)(z-2)}{1\,.\,2\,.\,3},\ \&c.$$

which expreſſion will then repreſent the correſponding ordinate to the abſciſs z; and conſequently the interpolation of the ſeries may be made general. Thus in the example propoſed,

Series	1		8		27		64
1ſt diff.		7		19		37	
2d diff.			12		18		
3d diff. conſt.				6			

Therefore, conſidering y as the correſponding ordinate to the abſciſs z, we have

$$y = 1 + 7z + \frac{12 . z (z - 1)}{1 . 2} + \frac{6 . z (z - 1) (z - 2)}{1 . 2 . 3}, \text{ or}$$

$$y = 1 + 3z + 3z^2 + z^3,$$

as it ought to be, from the nature of the ſeries. If, therefore, now we had to interpolate a term between each of the given ones, theſe terms would be $(1\frac{1}{2})^3$, $(2\frac{1}{2})^3$, $(3\frac{1}{2})^3$, $(4\frac{1}{2})^3$, &c.

And the ſame method is applicable in all caſes, but it ſometimes admits of abbreviation, if the law of the ſeries can be determined, and therefore this ſhould be the firſt conſideration when the law is not evident.

Let there now be propoſed the ſeries

$$1, \frac{1}{2}, \frac{3}{8}, \frac{5}{16}, \frac{35}{28}, \text{ \&c.}$$

where the law is not obvious, the interpolation of which is required.

By a little attention it will be ſeen that the ſeries is produced from the ſucceſſive multiplication of the terms of the ſeries $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$; in which the order of formation is manifeſt, and the interpolation of this, except for the term between 1 and $\frac{1}{2}$, is evident; the other interpolated terms being $\frac{2}{3}$, $\frac{4}{5}$, $\frac{6}{7}$, &c.: let then the term between 1 and $\frac{1}{2}$ be x, then the ſeries after interpolation will be

$$1, x, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \text{ \&c.}$$

and as the propoſed ſeries is generated from the continued multiplication of the ſeries 1, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, &c.; ſo will the interpolated terms required, be generated from the continued multiplication of the interpolated terms of this laſt ſeries, which will therefore be

$$x, \frac{2}{3}\, x, \frac{2 . 4}{3 . 5}\, x, \frac{2 . 4 . 6}{3 . 5 . 7}\, x, \text{ \&c.}$$

All, therefore, that is required, is to find the value of x, from which any interpolated term may be determined; and it may be further obſerved, that the term x of the above generating ſeries muſt neceſſarily be the ſecond term of the required ſeries after interpolation, or that term which falls between 1 and $\frac{1}{2}$. Let therefore the differences be taken as follows, *viz.*

Series	1		$\frac{1}{2}$		$\frac{3}{8}$		$\frac{5}{16}$		$\frac{35}{28}$		$\frac{63}{256}$ &c.
1ſt difference		$-\frac{1}{2}$		$-\frac{1}{8}$		$-\frac{1}{16}$		$-\frac{5}{128}$		$-\frac{7}{256}$ &c.	
2d difference			$\frac{3}{8}$		$\frac{1}{16}$		$\frac{3}{128}$		$\frac{3}{256}$ &c.		
3d difference				$-\frac{5}{16}$		$-\frac{3}{128}$		$-\frac{7}{256}$ &c.			
4th difference					$\frac{35}{128}$		$\frac{7}{256}$ &c.				
5th difference						$-\frac{63}{256}$ &c.					

Hence aſſuming y for any ordinate correſponding to any propoſed abſciſs z, the equation of the curve paſſing through the ſummits of the ordinates, will be

$$y = 1 - \tfrac{1}{2} z + \frac{3}{8} . \frac{z (z - 1)}{1 . 2} - \frac{5}{16} . \frac{z (z - 1) (z - 2)}{1 . 2 . 3} + \frac{35}{128} . \frac{z (z - 1) (z - 2) (z - 3)}{1 . 2 . 3 . 4} - \frac{63}{256} . \frac{z . (z - 1) (z - 2) (z - 3) (z - 4)}{1 . 2 . 3 . 4 . 5}.$$

But as the object of our inquiry is more particularly directed to the finding of the firſt interpolated term, repreſented above by x, we muſt make $z = \frac{1}{2}$; whence the above is reduced to

$$x = - \frac{1}{4} A + \frac{3}{16} B + \frac{15}{36} C + \frac{35}{64} D \text{ \&c.}$$

In which ſeries the order of formation of the co-efficients is obvious, A, B, C, D, &c. being repreſentatives of the preceding terms; and hence, by the ſummation of the ſeries, the value of x is found equal to 0.64052, and conſequently from what has been before obſerved, the interpolation of the propoſed ſeries is now complete, being as follows:

$$1, x, \tfrac{1}{2}, \frac{2}{3}\, x, \frac{1 . 3}{2 . 4}, \frac{2 . 4}{3 . 5}\, x, \frac{1 . 3 . 5}{2 . 4 . 6}, \frac{2 . 4 . 6}{3 . 5 . 7}\, x, \text{ \&c.}$$

If it had been required to interpolate two terms between each of the given terms, it would have only been neceſſary to have aſſumed $z = \frac{1}{3}$, and $\frac{2}{3}$, as is evident; and therefore needs no illuſtration.

Hence we ſee that the general equation of any curve, made to paſs through the ſummits of any number of equidiſtant ordinates, a, b, c, d, e, f, &c. will be

$$y = a + (b - a)\, z + (c - 2b + a) \frac{z (z - 1)}{1 . 2} + (d - 3c + 3b - a) \frac{z . (z - 1) (z - 2)}{1 . 2 . 3} \text{ \&c.}$$

which is Newton's formula in his "Methodus Differentialis." The limits of our article will not admit of a farther developement of the theory of interpolations, we muſt therefore refer the reader, who wiſhes for more complete information,

formation, to the work of Newton above quoted; to Stirling's "Tractatus de Summatione," &c. or to the tranſlation of the ſame by Holliday, publiſhed in 1749; and to the other tracts mentioned in the preceding part of this article, by Lalande, Mayer, &c. See alſo SERIES.

INTERPOSED ATTIC. See ATTIC.

INTERPOSITION, the ſituation of a body between two others, ſo as to hide them, or prevent their action.

The eclipſe of the ſun is occaſioned by an interpoſition of the moon between the ſun and us; and that of the moon by the interpoſition of the earth between the ſun and moon.

INTERPRETATION *of Laws* depends on more equitable and excellent principles than thoſe which prevailed among the Romans, who, when any doubt aroſe upon the conſtruction of their laws, ſtated the caſe to the emperor in writing, and took his opinion upon it. To interrogate the legiſlature, ſays judge Blackſtone, to decide particular diſputes, is not only endleſs, but affords great room for partiality and oppreſſion. The faireſt and moſt rational method to interpret the will of the legiſlator is by exploring his intentions at the time when the law was made, by ſigns the moſt natural and probable. Theſe ſigns are either the words, the context, the ſubject-matter, the effects and conſequence, or the ſpirit and reaſon of the law. *Words* are generally to be underſtood in their uſual and moſt known ſignification. If words are dubious, their meaning may be eſtabliſhed from the *context.* Thus the preamble often ſerves to aid the conſtruction of an act of parliament; and the compariſon of one law with other laws, made by the ſame legiſlator, and bearing ſome affinity or relation to the ſubject, will anſwer a ſimilar purpoſe. As to the *ſubject-matter,* words are always to be underſtood as having a regard to it. With reſpect to the *effects* and *conſequence,* the rule is, that where words bear either none, or a very abſurd ſignification, if literally underſtood, we muſt a little deviate from the received ſenſe of them. But after all, the moſt univerſal and effectual way of diſcovering the true meaning of a law, when the words are dubious, is by conſidering the *reaſon* and *ſpirit* of it; or the cauſe which moved the legiſlator to enact it. For when this reaſon ceaſes, the law itſelf ought likewiſe to ceaſe with it. From this method of interpreting laws by the reaſon of them, ariſes what we call *equity;* which ſee.

INTERPRETER, a perſon who explains the thoughts, words, or writings, of ſome other, which before were unintelligible.

The word *interpres,* according to Iſidore, is compoſed of the prepoſition *inter,* and *partes,* as ſignifying a perſon in the middle betwixt two parties, to make them mutually underſtand each other's thoughts. Others derive it from *inter,* and *præs, i. e. fidejuſſor, q. d.* a perſon who ſerves as ſecurity between two others, who do not underſtand one another.

There have been great debates about interpreting ſcripture. The Romaniſts contend, that it belongs abſolutely to the church; adding, that where ſhe is ſilent, reaſon may be conſulted; but, where ſhe ſpeaks, reaſon is to be diſregarded. The Proteſtants generally allow reaſon to be the ſovereign judge, or interpreter, though ſome among them have a ſtrong regard to ſynods, and others to the authority of the primitive fathers. Laſtly, others have recourſe to the ſpirit within every perſon to interpret for them; which is what Bochart calls ἀπόδειξις τȣ πνεύματος. It is, or at leaſt ought to be, the fundamental principle of all Proteſtants, and indeed of all Chriſtians, that every man ſhould interpret ſcripture for himſelf, admitting no compulſory or controlling authority, but at the ſame time availing himſelf of all the aſſiſtances which others may afford for directing his inquiries and determining his judgment. "Let every man," ſays ſcripture itſelf, "be fully perſuaded in his own mind."

INTERREGNUM, the time during which a throne is vacant, or a kingdom without a head.

In hereditary kingdoms, as England, there are properly no interregnums. (See *Right of* CROWN.) In elective kingdoms, the interregnums are extremely liable to factions and diſorders.

INTERREX, a magiſtrate who governs during an interregnum, or in the interval between the death of a monarch and the election or inauguration of his ſucceſſor.

This magiſtrate was eſtabliſhed in old Rome, and was almoſt as ancient as the city itſelf. After the death of Romulus there was an interregnum of a year, during which the ſenators were each interrex in their turn, five days a-piece.

After the eſtabliſhment of conſuls, and a commonwealth, though there were no kings, yet the name and function of interrex were ſtill preſerved; for when the magiſtrates were abſent, or when there was any irregularity in their election, or they had abdicated, ſo that the comitia could not be held, provided they were unwilling to create a dictator, they made an interrex, whoſe office and authority were to laſt five days; after which they made another. To the interrex was delegated all the regal and conſular authority, and he performed all their functions. He aſſembled the ſenate, held comitia, or courts, and took care the election of magiſtrates was according to the rules. Indeed, at firſt it was not the cuſtom of the interrex to hold comitia; at leaſt we have no inſtance of it in the ancient Roman hiſtory.

The patricians alone had the right of electing an interrex. This office fell with the republic, when the emperors made themſelves maſters of every thing.

INTERRMENT, INTERMENT, or *Enterment,* the act of *interring, i. e.* burying, or laying a deceaſed perſon in the ground. See BURIAL.

The excommunicated are not to be interred in holy, *i. e.* in conſecrated ground. The ancients did not interr their dead; they burnt them, as the Indians do at this day. See BURNING.

The Abyſſinians, in lieu of interring their dead, ſhut them up in the bodies of trees, dug hollow for this purpoſe.

Gardeners alſo interr, or earth up, celery, endive, and lettuce, to blanch, or whiten, and make them the tenderer.

To interr wild ſtocks in ditches, is what Columella calls *deponere ſemina ſcrobibus.* There are ſome ſeeds, as willows, olives, &c. which grow very well, by *interring* their truncheons, *i. e.* cutting a truncheon, or piece, off at both ends, and planting it in the ground; which is what the Latins call *inhumare taleas, taleis ſerere.*

INTERROGATE, a judiciary act, performed by a judge, or commiſſioner deputed to examine or queſtion a party; who firſt gives his oath, that he will anſwer truly to every thing he is interrogated.

INTERROGATION, in *Rhetoric.* See EROTESIS.

As to the difference between *interrogation* and *exclamation,* (which ſee) we may obſerve, that interrogations are often employed with propriety in the courſe of no higher emotions than naturally ariſe in purſuing ſome cloſe and earneſt reaſoning; whereas exclamations belong only to ſtronger emotions of the mind, as ſurpriſe, admiration, anger, joy, grief, and the like. Both interrogation and exclamation, and all paſſionate figures of ſpeech, being natural ſigns of a moved and agitated mind, when properly uſed, operate upon us by means of ſympathy. Hence it follows, that the great rule with regard to ſuch figures is, that the writer attend to the manner in which nature dictates to us to expreſs any emotion or paſſion, and that he give his language that turn and no other; above all, that he never affect the ſtyle of a paſſion which he does not feel. Interrogations may be uſed with freedom; but nothing has a worſe effect than the frequent and unſeaſonable uſe of exclamations to which raw and juvenile writers are addicted. They render compoſitions frigid to exceſs.

INTERROGATION, in *Grammar*, is a point which ſerves to diſtinguiſh ſuch parts of a diſcourſe, where the author ſpeaks as if he were aſking queſtions. Its form is this (?).

INTERROGATORIES, in *Law*, are particular queſtions demanded of witneſſes brought in to be examined in a cauſe, eſpecially in the court of chancery. And theſe interrogatories muſt be exhibited by the parties in ſuit on each ſide; which are either direct for the party that produces them, or counter on behalf of the adverſe party; and generally both plaintiff and defendant may exhibit, direct, and counter or croſs interrogatories. They are to be pertinent, and only to the points neceſſary; and either drawn or peruſed by counſel, and to be ſigned by them. See COMMISSION *to examine witneſſes*, and EXAMINATION *of witneſſes*. See alſo CONTEMPT.

INTERRUPTED SUTURE, in *Surgery*. See SUTURE.

INTERRUPTION, in *Matters of Proportion*, denotes the ſame with *disjunction*.

It is noted thus (::), and ſignifies the breaking off of the ratio in the middle of four disjunct or diſcrete proportionals: as A : B :: C : D; that is, as A is to B ſo is C to D. See RATIO, PROPORTION, &c.

INTERRUPTION is alſo a figure in *Rhetoric*, wherein a perſon breaks off his diſcourſe ſuddenly, to ſhew ſome paſſion.

INTERSCENDENT, in *Algebra*, is applied to quantities, when the exponents of their powers are radical quantities. Thus $Z^{\sqrt{2}}$, $z^{\sqrt{m}}$, &c. are interſcendent quantities. See FUNCTION.

INTERSECTION, in *Mathematics*, the cutting of one line or plane by another; or the point or line wherein two lines, or two planes, cut each other.

The mutual interſection of two planes is a right line. The centre of a circle is in the interſection of two diameters. The central point of a regular or irregular figure of four ſides, is the point of interſection of the two diagonals.

The equinoxes happen when the ſun is in the interſections of the equator and the ecliptic.

INTERSOILING, in *Huſbandry*, the laying one kind of ſoil, or mould, upon another; as clay on ſand, ſand on earth, &c.

INTERSPERSUM VACUUM. See VACUUM.

INTERSPINALES, in *Anatomy*, are ſmall muſcles placed in the intervals of the ſpinous proceſſes of the vertebræ, and diſtinguiſhed as belonging to the neck, back, or loins.

Interſpinales colli, interſpiniens, epineux du cou, are arranged in pairs, as the proceſſes, to which they are connected, are bifurcated. There are ſix pairs, of which the firſt is placed between the ſpinous proceſſes of the ſecond and third cervical vertebræ, the ſecond between the third and fourth, and ſo on to the ſixth, which is found between the laſt cervical and firſt dorſal vertebræ. Their ſurfaces are flattened, and they have ſome reſemblance to lengthened ſquares; on the outſide, they are in contact with the multifidus ſpinæ; on the inſide, the two muſcles compoſing the pair are in contact; their upper and lower edges are fixed to the ſpinous proceſſes which bound the intervals containing them. With the exception of a few ſhort aponeurotic fibres at their extremities, they are entirely fleſhy. By approximating the ſpinous proceſſes, they extend the cervical portion of the ſpine.

Interſpinales dorſi, epineux du dos. Small muſcles are ſometimes placed between the ſpinous proceſſes of the lower lumbar vertebræ; but they are more frequently abſent.

Interſpinales lumborum, epineux des lombes. Theſe are ſix in number, ſeldom deficient, tendinous at their extremities, and attached above and below to the ſpinous proceſſes of the lumbar vertebræ. They are covered at the ſides by the multifidi ſpinæ. The firſt is placed between the twelfth dorſal and firſt lumbar vertebra; the ſixth between the laſt lumbar and the ſacrum. They produce in the loins the ſame effect as the correſponding muſcles do in the neck.

INTERSTELLAR, a word uſed by ſome authors to expreſs thoſe parts of the univerſe that are without, and beyond, the limits of our ſolar ſyſtem.

In the interſtellar regions are ſuppoſed to be ſeveral other ſyſtems of planets moving round the fixed ſtars, as the centres of their reſpective motions; and if it be true, as it is not improbable, that each fixed ſtar is thus a ſun to ſome habitable orbs, that move round it, the interſtellar world will be infinitely the greateſt part of the univerſe.

INTERTIES, or INTERDUCES, in *Architecture*, thoſe ſmall pieces of timber which lie horizontally betwixt the ſummers, or betwixt them and the ſell, or raiſing plate.

INTERTRANSVERSI, in *Anatomy*, or *intertranſverſarii*, or *intertranſverſales*, are ſmall muſcles belonging to the ſpine, placed in the intervals of the tranſverſe proceſſes of the vertebræ, and diſtinguiſhed in the different regions of the ſpine by the additional terms of colli, dorſi, and lumborum.

Intertranſverſi colli, intertranſverſiens, petits tranſverſaires du col. Theſe muſcles are diſtinguiſhed into anterior and poſterior, as the tranſverſe proceſſes to which they are attached, are bifid at their ends. The anterior ones are ſix in number; the firſt is placed between the tranſverſe proceſſes of the firſt and ſecond vertebræ, and the ſixth between thoſe of the ſixth and ſeventh. They are flattened in their figure, and the firſt is longer than the ſucceeding ones. On the front, they are covered by the rectus capitis major anticus; behind, they are in contact with the anterior branches of the cervical nerves; their upper and lower margins are attached to the tranſverſe proceſſes.

The poſterior intertranſverſi are five in number, the firſt being placed between the tranſverſe proceſſes of the ſecond and third vertebræ, and the fifth between thoſe of the ſixth and ſeventh. They very much reſemble the preceding muſcles. They correſpond in front to the anterior branches of the cervical nerves, and are covered behind by the ſplenius, tranſverſalis colli, and ſacrolumbalis. Their margins are fixed to the tranſverſe proceſſes. They are almoſt entirely fleſhy. By drawing the tranſverſe proceſſes together, theſe muſcles will inflect the neck laterally.

Intertranſverſi dorſi, petits tranſverſaires du dos. Theſe reſemble in the back the correſponding muſcles of the loins, but are ſmaller; they are placed between the points of the tranſverſe proceſſes. Some of the lower ones are of a conſpicuous ſize; they become gradually more ſlender and tendinous, and, in the upper part of the back, appear more like thin tendons than muſcles. In the latter ſituation they often do not exiſt. In front they lie on the intercoſtal muſcles, and they are covered behind by the longiſſimus dorſi and ſacrolumbalis; above and below they are fixed to the tranſverſe proceſſes. They produce the lateral inflexions of the dorſal vertebræ.

Intertranſverſi lumborum, tranſverſaires des lombes. Theſe are ſmall muſcular planes filling the intervals between the tranſverſe proceſſes of the lumbar vertebræ. Their number is five, the firſt being placed between the laſt dorſal and the firſt lumbar vertebra, and the laſt between the fourth and fifth lumbar vertebræ. They are thin, flattened, and quadrilateral. They correſpond in front to the quadratus lumborum, and behind, to the ſacrolumbalis; their upper and lower edges are fixed to the tranſverſe proceſſes. They are almoſt entirely fleſhy. Their office is that of inclining the vertebral column towards one ſide, or of reſtoring it to the erect ſtate after it has been ſo inclined.

INTERTRIGO, in *Medicine*, παρατριμμα of the Greeks, ſignifies an erythematous affection of the ſkin, a ſmooth, ſhining redneſs and tenderneſs of the part, chiefly from friction.

The *intertrigo* moſt commonly ariſes in thoſe parts of the ſurface, which lie in contact with each other, and are liable therefore to conſiderable attrition during motion; or in thoſe which are ſubject to friction and preſſure from other cauſes; and more eſpecially when, at the ſame time, any acrid fluid is preſent. Whence it is very frequent about the top of the thighs and the perineum of infants, when the cloths in which they are wrapped become wetted with the urine. Similar affections of the ſkin are alſo liable to occur in perſons who take exerciſe on horſeback, or in the feet of thoſe who have walked a conſiderable diſtance, eſpecially in tight ſhoes, and in the backs and ſhoulders of ſick perſons, long confined to bed. The firſt of theſe varieties, which occur in the *plicæ* or duplicatures of the ſkin, or originate from the attrition of the bandages impregnated with urine, &c. Sauvages has called *Erythema intertrigo*; the latter from friction of the clothes, or bed, he denominates *Erythema paratrimma*. See his Noſol. Method. Claſs i. Genus 11. ſpec. 5 and 6.

Dr. Willan alſo treats of the former varieties of the diſorder under the ſame head. When ſpeaking of erythema, he ſays, we may rank under the preſent article that ſpecies of intertrigo which is produced in ſome perſons by the attrition of contiguous ſurfaces, as beneath the breaſts, round the *axillæ*, in the groin, and at the upper part of the thighs, and is attended with a glairy and fetid ſecretion. The intertrigo is moſt troubleſome when it affects the thighs; it commences where they are in contact with the ſcrotum, and extends upwards to the groin and *nates*, round the *ſcrotum*, and down the hollow of the thigh In places where the friction is ſtrongeſt, the redneſs is continuous, but it terminates at the edges in a mixed colour, ſuch as characterizes effloreſcences generally. This complaint is moſt frequent in very warm weather, and affects perſons of the ſanguine temperament, eſpecially thoſe who are corpulent. It ſometimes terminates in the *prurigo*, or *pſoriaſis ſcrotalis*. An appearance analogous to the intertrigo, is produced by acrimonious diſcharges in perſons labouring under dyſentery, gonorrhœa, &c.; in females affected with fluor albus, or uterine ſcirrhus, and in infants, from the ſtimulus of the urine, &c. with which their clothes are almoſt conſtantly wetted. (See Willan on Cutaneous Diſeaſes, p. 481.) He refuſes to claſs this morbid ſtate of the ſkin with excoriation, or ſuperficial ulceration, as ſeveral writers both ancient and modern have done; and therefore excludes from the intertrigo thoſe excoriations included in the 6th ſpecies, or *Erythema paratrimma*, of Sauvages.

Frequent ablution with tepid water is neceſſary to allay the heat and uneaſineſs which attend this complaint, to remove the viſcid ſecretion from the ſurface, and to prevent excoriation. When the ſkin is fretted by the diſcharge of an acrimonious fluid, ſome relief is obtained by the application of dry abſorbent powders; in caſe of abraſion and fiſſures, the elder-ointment may be applied with much advantage.

INTERTWISTED Suture. See Suture.

INTERVAL, the diſtance or ſpace between two extremes, either in time or place.

The word comes from the Latin *intervallum*, which, according to Iſidore, ſignifies the ſpace *inter foſſam et murum*, between the ditch and the wall: others note, that the ſtakes or piles, driven into the ground in the ancient Roman bulwarks, were called *valla*, and the interſtices or vacancy between them *intervalla*.

Interval, *Angle of*. See Angle.

Intervals, *Lucid*. See Lucid.

Interval, in *Muſic*, the difference between two ſounds, in reſpect of acute and grave; or that imaginary ſpace terminated with two ſounds differing in acuteneſs or gravity. When two or more ſounds are compared in this relation, they are either equal or unequal in the degree of tune: ſuch as are equal are called *uniſons*, with regard to each other, as having one tune; the other, being at a diſtance from each other, conſtitute what we call an *interval* in muſic; which is properly the diſtance in tune between two ſounds.

Intervals are diſtinguiſhed into *ſimple* and *compound*.

Interval, *Simple*, is that without parts, or diviſion: ſuch are the octave, and all that are within it; as the ſecond, third, fourth, fifth, ſixth, and ſeventh, with their varieties.

Interval, *Compound*, conſiſts of ſeveral leſſer intervals: ſuch are all thoſe greater than the octave; as the ninth, tenth, eleventh, twelfth, &c. with their varieties. But this diſtinction, it is to be obſerved, regards practice only, becauſe there is really no ſuch thing as a leaſt interval. Beſides, by a *ſimple* interval is not meant here the leaſt practiſed, but ſuch as though it were equal to two or more leſſer, which are in uſe, yet when we would make a ſound move ſo far up or down we always paſs immediately from one of its terms to the other. What is meant then by a *compound* interval will be very plain: it is ſuch, whoſe terms are in practice taken either in immediate ſucceſſion, or ſuch where the ſound is made to riſe and fall from the one to the other, by touching ſome intermediate degree; ſo that the whole becomes a compoſition of all the intervals from one extreme to the other.

What we here call a *ſimple* interval, the ancients called a *diaſtem*, and the *compound* they call a *ſyſtem*.

Each of theſe had its differences; even of the ſimple there are ſome greater, and others leſs: but they are always diſcord; but of the compound, or ſyſtems, ſome are concord, others diſcord. Uniſons, it is plain, cannot poſſibly have any variety; for where there is no difference, as in uniſonance, which flows from a relation of equality, it is plain there can be no diſtinction: uniſons therefore muſt all be concords. But an interval depending on a difference of tune, or a relation of inequality, admits of variety; and ſo the terms of every interval, according to their particular relation or difference, make either concord or diſcord. Some indeed have reſtrained the word *concord* to intervals, making it include a difference in tune: but this is precarious; for as the word concord ſignifies an agreement of ſounds, it is certainly applicable to uniſons in the firſt degree. Intervals, it is plain, may differ in magnitude, and there may be an infinite variety, according to the poſſible degree of tune; for there is no difference ſo great or ſo little, but a greater or a leſs may poſſibly be conceived. It is true, with regard to practice, there are limits, which are the greateſt and leaſt intervals our ears are judges of, and which may be actually produced by voice or inſtrument.

The degrees of tune are proportional to the number of vibrations of the ſonorous body in a given time, or the velocity of their courſes and recourſes. Now theſe differences in tune conſtitute, as has been already ſaid, the intervals in muſic; theſe therefore muſt be greater or leſs, as the differences are; and it is the quantity of theſe which is the ſubject of the mathematical part of muſic. Thoſe intervals are meaſured, not in the ſimple differences, or in arithmetical ratios of the numbers expreſſing the lengths or vibrations, but in their geometric ratios; ſo that the ſame interval depends on the ſame geometrical ratio, and *vice verſâ*. It is, however, to be obſerved, that in comparing the equality of intervals, the ratios expreſſing them muſt be all of one ſpecies; otherwiſe this abſurdity will follow, that the ſame two ſounds may make different intervals. To deſcribe the particular methods of meaſuring the inequality of intervals would be too tedious: this one rule may be obſerved, that, to determine in general which of two or more intervals are the greateſt, take all the ratios as proper fractions, and the leaſt fraction will be the greateſt interval.

The ancients were extremely divided about the manner of meaſuring intervals. Pythagoras and his followers meaſured them by the ratios of numbers. They ſuppoſed the differences of gravity and acuteneſs to depend on the different velocities of the motion which cauſes ſound; and therefore concluded, that they could only be accurately meaſured by the ratios of thoſe velocities. Which ratios are ſaid to have been firſt inveſtigated by Pythagoras, on occaſion of his paſſing by a ſmith's ſhop, and obſerving a concordance betwixt the ſounds of hammers ſtriking on the anvil.

Ariſtoxenus oppoſed this. He thought reaſon and mathematics had nothing to do in this caſe, and that ſenſe was the only judge in the diſpute; the other being too ſubtile to be of any uſe. He therefore determined the octave, fifth, and fourth, which are the moſt ſimple concords, by the ear; and by the difference of the fourth and fifth he found out the tone; which, once ſettled as an interval the ear could judge of, he pretended to meaſure every interval by various additions, and ſubtractions, made of theſe mentioned, one with another: but this method is very inaccurate.

Ptolemy keeps a middle courſe betwixt the two: he finds fault with the one for deſpiſing reaſon, and with the other for excluding ſenſe; and ſhews how theſe two may mutually aſſiſt each other in this matter. Malcolm.

Intervals are founded on certain ratios or proportions expreſſible in numbers, which may all be analyſed into the prime numbers 2, 3, and 5. And all intervals may be found from the octave, fifth and third major, which reſpectively correſpond to thoſe numbers. Theſe are the muſician's elements, from the various combinations of which all the agreeable variety of relations of ſounds reſults.

This is the modern ſyſtem; and a late author aſſures us, it may be looked on as the ſtandard of truth; and that every interval that occurs in muſic is good or bad, as it approaches to or deviates from what it ought to be, on theſe principles. He obſerves, that the doctrine of ſome of the ancients ſeems different. Ptolemy, for inſtance, introduces not only the primes 2, 3, 4, 5, but alſo 7 and 11, &c. Nay, he ſeems to think all fourths good, provided their component intervals may be expreſſed by ſuper-particular ratios. But theſe are juſtly exploded conceits; and it ſeems not improbable, that the contradictions of different numerical hypotheſes, even in the age of Ariſtoxenus, and their inconſiſtency with experience, might lead him to reject numbers altogether. Dr. Pepuſc. ap. Phil. Tranſ. N°481. p. 267, 268.

M. Euler defines an interval, the meaſure of the difference of an acute and grave ſound. Tentam. Nov. Theor. Muſic, p. 72 and p. 103.

Suppoſe three ſounds a, b, c, of which c is the acute, a the moſt grave, and b the intermediate ſound. From the preceding definition it appears, that the interval between the ſounds a and c is the aggregate of the intervals between a and b, and between b and c. Therefore, if the interval between a and b be equal to that between b and c, which happens when $a : b :: c : d$, the interval between a to c will be double the interval a to b, or b to c. This being conſidered, it will appear that intervals ought to be expreſſed by the meaſures of the ratios conſtituting the ſounds forming thoſe intervals. But ratios are meaſured by the logarithms of fractions, the numerators of which denote the acute ſounds, and the denominators the grave. Hence the interval between the ſounds a and b will be expreſſed by the logarithm of the fraction $\frac{b}{a}$, which is uſually denoted by $l\frac{b}{a}$, or, which comes to the ſame, $lb - la$. The interval therefore of equal ſounds, a to a, will be null, as $la - la = 0$. The interval called an octave, or diapaſon, will be expreſſed by the logarithm of 2: and the interval of the fifth or diapente, will be $l3 - l2$. From whence it appears that theſe intervals are incommenſurable: ſo that no intervals, however ſmall, can be an aliquot part, both of the octave and fifth. The like may be ſaid of the intervals $l\frac{3}{2}$, and $l\frac{5}{4}$, and others whoſe logarithms are diſſimilar. But intervals expounded by logarithms of numbers, which are powers of the ſame root, may be compared. Thus, the interval of the ſounds 27 : 8, will be to the interval of the ſounds 9 : 4, as 3 is to 2: For $l\frac{27}{8} = 3l\frac{3}{2}$, and $3l\frac{9}{4} = 2l3$. Euler, ibid. p. 74.

But though the logarithms of numbers, which are not powers of the ſame root, be incommenſurable, yet an approximating ratio of ſuch may be found. Thus the meaſure of the octave is $l2 = 0.3010300$, and the meaſure of the fifth is $l3 - l2 = 0.1760913$. Hence the interval of the octave will be to that of the fifth, nearly as 3010300 to 1760913; which ratio being reduced to ſmaller terms, in the method explained under the head Ratio, will give us theſe ſimple expreſſions for the ratio of the octave and fifth: 2 : 1, 3 : 2, 5 : 3, 7 : 4, 12 : 7, 17 : 10, 29 : 17, 41 : 24, 53 : 31, which laſt is very near the truth. Euler, ibid. p. 75.

In like manner intervals may be divided into any number of equal parts: for this purpoſe we need only divide the logarithm of the propoſed interval into the ſame number of parts, and then find its correſpondent number by the tables. The ratio of the number ſo found, to unity, will give the required ratio of the divided interval to its propoſed part. Thus let the third part of an octave be required; its logarithm will be $= 0.1003433 = \frac{1}{3}l2$. The ratio correſponding nearly to this will be 63 : 50, or leſs accurately, 29 : 23, or 5 : 4, which laſt expreſſes the third major; and this is by the leſs knowing taken for the third part of an octave, and ſeems to be ſuch on our harpſichords and organs, where from C to E is a third, from E to G ※ another, and from G ※ or A♭ to c another third. But the more intelligent know, that G ※ and A♭ ought not to be reputed the ſame ſound, ſince they differ by a dieſis enharmonica, which is nearly equal to two commas.

M. Euler has inſerted a table of intervals in his "Tentamen Novæ Theoriæ Muſicæ:" he ſuppoſes the logarithm or meaſure of the octave to be 1.000000, whence the logarithm of the fifth will be 0.584962, and the logarithm of the third major will be 0.321928: from theſe the meaſures of all other intervals may be found. But as it has been cuſtomary for muſicians to meaſure their intervals by commas, we ſhall here inſert a table of intervals, with their meaſures in commas; where we ſuppoſe the logarithm or meaſure of the comma $\frac{81}{80}$ to be 1.00000: hence the logarithm of the octave $\frac{2}{1}$ will be 55.79763, that of the fifth 32.63952, and laſtly, that of the third major 17.96282. From theſe all the other intervals may be found in the manner expreſſed in the table; where the firſt column ſhews the names of the ſeveral intervals; the ſecond, the proportions of ſounds forming theſe intervals; the third, the compoſition of theſe proportions from the primes 2, 3, and 5. The ſmaller figures marked above, and ſomewhat to the right of the larger, indicate the power to which the number expreſſed by the larger figures is raiſed. Thus $\frac{2^{17}3}{5^{8}}$ ſhews that the ſeventeenth power of 2 multiplied by 3, and divided by the eighth power of 5, will produce $\frac{393216}{390625}$ in the ſecond column, and that this is the proportion expreſſing the interval called *eſchaton* in the firſt column. The fourth column of the table contains ſome ſimple ſigns of ſome of the intervals, as *h* for *hyperoche*, *d* for *dieſis*, &c. and the fifth column ſhews how the intervals ariſe from others: thus over againſt ſemitone major, I find in the fourth column *S*, which is here only an arbitrary mark for this ſemitone; and in the fifth column I find $s + d = \text{IV} - \text{III}$, which ſignifies that the ſemitone major is equal to the ſum of the ſemitone minor and dieſis, or to the difference between the fourth and the third major. Obſerve, that the comma is marked by a dot (·); when this is placed over the letter or other ſymbol, it ſignifies that the interval is ſuppoſed to be heightened by a comma; and on the contrary, when the point is placed below, it ſignifies that the interval muſt be diminiſhed by a comma; thus $\dot{t} = T$ ſignifies that the tone minor increaſed by a comma is equal to a tone-major, and *vice verſâ:* $\underset{\cdot}{T} = t$ ſhews that the tone-major diminiſhed by a comma is equal to the tone-minor. The ſigns +, −, =, are here taken in the ſame ſenſe as in algebra, to ſignify addition, ſubtraction, and equality. So likewiſe the dot placed between two numbers, or between a number and the ſymbol of an interval, ſignifies that the interval is to be multiplied by the number. Thus 2. IV ſhews that the fourth is doubled; and thus $7^{b} = \text{VI} + S = 2.\,\text{IV} = \text{VIII} - T$, ſhews, that the leſſer flat ſeventh is equal to the ſixth major and ſemitone-major, or alſo to two fourths, or to the octave when the tone-major has been taken from it. Laſtly, the ſixth column of the table ſhews the meaſures, or logarithms of the ratios in the ſecond column. Theſe are not the common logarithms of the tables where 1.0000000 is the logarithm of 10. But here 1.00000 is aſſumed as the logarithm of $\frac{81}{80}$, or of the comma, as before mentioned. Theſe logarithms are eaſily derived from the common, of the large tables of Vlacq, or Briggs: thus the logarithm of 2, or the octave = 0.3010299957; the logarithm of $\frac{3}{2}$, or of the fifth = 0.1760912590: and laſtly, the logarithm of $\frac{5}{4}$, or of the third major = 0.0969100130. Now theſe logarithms being ſeverally divided by the logarithm of $\frac{81}{80}$, or the comma = 0.0053950139; the quotients will give the number of commas in an octave = 55.79763; in a fifth = 32.63952; and in a third major = 17.96282. Hence all the reſt may be found by addition and ſubtraction only. Here follows the Table.

A Table of the Muſical Intervals with their Meaſures.

Names of the Intervals.	Proportions expreſſing the Intervals.	Compoſition of the Proportions from 2, 3, and 5.	Simple Signs.	Complex Signs to ſhew the Compoſition of Intervals.	Meaſures by Commas.
Eſchaton of Henſling - -	$\frac{393216}{390625}$	$\frac{2^{17}3}{5^{8}}$		$l - h = 2d - s = 3d - S$	0.53222
Diaſchiſma of Euler - - -	$\frac{2048}{2025}$	$\frac{2^{11}}{3^{4}\cdot 5^{2}}$		$\underset{\cdot}{l}$	0.90917
Comma - - - - - -	$\frac{81}{80}$	$\frac{3^{4}}{2^{4}\cdot 5}$		$T - t$	1.00000
Comma of Pythagoras - - -	$\frac{531441}{524288}$	$\frac{3^{12}}{2^{19}}$		$6\,T - \text{VIII}$	1.09083
Hyperoche - - - - -	$\frac{3125}{3072}$	$\frac{5^{5}}{2^{10}3}$	*h*	$s - d = S - 2d$	1.37695
EnharmonicDieſis, or diminiſhed ſecond	$\frac{128}{125}$	$\frac{2^{7}}{5^{3}}$	*d*	$S - s$	1.90917
Semi-toned Minor, or leaſt Chromatic Dieſis - - - -	$\frac{25}{24}$	$\frac{5^{2}}{2^{3}\cdot 3}$	*s*	$t - S = d + h = \text{III} - 3^{b}$	3.28612

A TABLE of the Muſical Intervals with their Meaſures.

Names of the Intervals.	Proportions expreſſing the Intervals.	Compoſition of the Proportions from 2, 3, and 5.	Simple Signs.	Complex Signs to ſhew the Compoſition of Intervals.	Meaſures by Commas.
Limma of the Greek ſcale, or deficient Semitone Major - -	$\frac{256}{243}$	$\frac{2^8}{3^5}$		$\underset{\cdot}{S} = IV - 2\dot{T}$	4.19529
Leſſer Limma, or redundant Semitone Minor - - -	$\frac{135}{128}$	$\frac{3^3 \cdot 5}{2^7}$		$\dot{s} = T - S$	4.28612
Semitone Major - - - -	$\frac{16}{15}$	$\frac{2^4}{3 \cdot 5}$	S	$s + d = IV - III$	5.19529
Apotome of the Greek ſcale - -	$\frac{2187}{2048}$	$\frac{3^7}{2^{11}}$		$T - \underset{\cdot}{S} = \ddot{s}$	5.28612
Greater Limma, or redundant Semitone Major - - -	$\frac{27}{25}$	$\frac{3^3}{5^2}$		$\dot{S} = T \quad s$	6.19529
Double Semitone Minor -	$\frac{625}{576}$	$\frac{5^4}{2^6 \cdot 3^2}$		$2\,s = t - \dot{d}$	6.57224
Greateſt Limma, or redundant double Semitone Minor - -	$\frac{1125}{1024}$	$\frac{3^2 \cdot 5^3}{2^{10}}$		$s + \dot{s} = T - d$	7.57224
Tone Minor - - - - - -	$\frac{10}{9}$	$\frac{2 \cdot 5}{3^2}$	t	$S + s = T = IV - 3^{\flat} = III - T$	8.48141
Tone Major - - - - - -	$\frac{9}{8}$	$\frac{3^2}{2^3}$	T	$\dot{t} = V - IV$	9.48141
Diminiſhed Third - - - -	$\frac{256}{225}$	$\frac{2^8}{3^2 \cdot 5^2}$		$t + d = 2\,S$	10.39058
	$\frac{144}{125}$	$\frac{2^4 \cdot 3^2}{5^3}$		$T + d = 3^{\flat} - s$	11.39058
Superfluous Second - -	$\frac{125}{108}$	$\frac{5^3}{2^2 \cdot 3^3}$		$t + s$	11.76753
	$\frac{75}{64}$	$\frac{3 \cdot 5^2}{2^6}$		$T + s = 3^{\flat} - d$	12.76753
Trihemitone of the Greek ſcale, or deficient Third Minor - -	$\frac{32}{27}$	$\frac{2^5}{3^3}$		$\underset{\cdot}{3}^{\flat} = t + S = IV - T$	13.67670
Third Minor - - - - - -	$\frac{6}{5}$	$\frac{2 \cdot 3}{5}$	$3^{\flat}$	$T + S = V - III$	14.67670
Trihemitone Major - - - -	$\frac{4096}{3375}$	$\frac{2^{12}}{3^3 \cdot 5^3}$		$3\,S = T + S + d$	15.58587

A Table of the Muſical Intervals with their Meaſures.

Names of the Intervals.	Proportions expreſſing the Intervals.	Compoſition of the Proportions from 2, 3, and 5.	Simple Signs.	Complex Signs to ſhew the Compoſition of Intervals.	Meaſures by Commas.
Extreme diminiſhed Fourth	$\frac{768}{625}$	$\frac{2^{8}.\,3}{5^{4}}$		$3^{b} + d = \mathrm{IV} - 2\,s$	16.58587
Third Major	$\frac{5}{4}$	$\frac{5}{2^{2}}$	III	$\mathrm{III} = \mathrm{V} - 3^{b}$	17.96282
Ditonus of the Greek Scale, or redundant Third Major	$\frac{81}{64}$	$\frac{3^{4}}{2^{6}}$		$\dot{\mathrm{I}}\mathrm{II} = 2\,\mathrm{T}$	18.96282
Diminiſhed Fourth	$\frac{32}{25}$	$\frac{2^{5}}{5^{2}}$		$\mathrm{III} + d = \mathrm{IV} - s$	19.87199
Superfluous Third	$\frac{}{96}$	$\frac{5^{3}}{2^{5}.\,3}$		$\mathrm{III} + \dot{s}$	21.24894
Fourth	$\frac{4}{3}$	$\frac{2^{2}}{3}$	IV	$\mathrm{III} + \mathrm{S} = \mathrm{VIII} - \mathrm{V}$	23.15811
Redundant Fourth	$\frac{27}{20}$	$\frac{3^{3}}{2^{2}.\,5}$		$\mathrm{I}\dot{\mathrm{V}} = 3^{b} + \mathrm{T}$	24.15811
Superfluous Fourth	$\frac{25}{18}$	$\frac{5^{2}}{2.3^{2}}$		$\mathrm{I}\underset{\cdot}{\mathrm{V}} + s$	26.44423
Semi-diapente of the Greek ſcale	$\frac{1024}{729}$	$\frac{2^{10}}{3^{6}}$		$\mathrm{IV} + \mathrm{S}$	27.35340
Tritonus, or falſe Fourth	$\frac{45}{32}$	$\frac{3^{2}.\,5}{2^{5}}$		$\mathrm{IV} + \dot{s} = \mathrm{V} - \mathrm{S}$	27.44423
Semi-diapente, or falſe Fifth	$\frac{64}{45}$	$\frac{2^{6}}{3^{2}.\,5}$		$\mathrm{IV} + \mathrm{S}. = \mathrm{V} - s$	28.35340
Tritonus of the Greek Scale	$\frac{723}{12}$	$\frac{3^{6}}{2^{9}}$		$3\,\mathrm{T} = \mathrm{V} - \mathrm{S} = \mathrm{IV} + \ddot{s}$	28.44423
Diminiſhed Fifth	$\frac{36}{25}$	$\frac{2^{2}.\,3^{2}}{5^{2}}$		$\mathrm{V} - s = 2.3^{b}$	29.35340
Deficient Fifth	$\frac{40}{27}$	$\frac{2^{3}.\,5}{3^{3}}$		$\underset{\cdot}{\mathrm{V}} = \mathrm{IV} + s$	31.63952
Fifth	$\frac{3}{2}$	$\frac{3}{2}$	V	$\mathrm{V} + \mathrm{T} = \mathrm{III} + 3$	32.63952
Superfluous Fifth	$\frac{25}{16}$	$\frac{5^{2}}{2^{4}}$		$\mathrm{V} + \dot{s} = 2.\,\mathrm{III}$	35.92564

A TABLE of the Muſical Intervals with their Meaſures.

Names of Intervals.	Proportions expreſſing the Intervals.	Compoſition of the Proportions from 2, 3, and 5.	Simple Signs.	Complex Signs to ſhew the Compoſition of Intervals.	Meaſures by Commas.
Sixth Minor	$\frac{8}{5}$	$\frac{2^3}{5}$	6^{b}	$\text{V} + \text{S} = \text{VIII} - \text{III}$	37.83481
Sixth Major	$\frac{5}{3}$	$\frac{5}{3}$	VI	$\text{V} + t = \text{VIII} - 3^{b}$	41.12093
Hexachord of the Greek Scale, or redundant Sixth Major	$\frac{27}{16}$	$\frac{3^3}{2^4}$		$\dot{\text{VI}} = \text{V} + \text{T} = \text{VIII} - \dot{3}^{b}$	42.12093
Leſſer diminiſhed Seventh	$\frac{128}{75}$	$\frac{2^7}{3 \cdot 5^2}$		$6^{b} + \text{S} = 2 \,.\, \text{IV} - s = 7^{b} - s$	43.03010
Greater diminiſhed Seventh	$\frac{216}{125}$	$\frac{2^3 \cdot 3^3}{5^3}$		$6^{b} + \dot{\text{S}} = \dot{7}^{b} - s$	44.63010
Leſſer ſuperfluous Sixth	$\frac{125}{72}$	$\frac{5^3}{2^3 \cdot 3^2}$		$\text{VI} + s$	44.40705
Greater ſuperfluous Sixth	$\frac{225}{128}$	$\frac{3^2 \cdot 5^2}{2^7}$		$\text{VI} + \dot{s} = \text{VIII} - 2\,\text{S}$	45.40705
Leſſer Seventh Minor	$\frac{16}{9}$	$\frac{2^4}{3^2}$	7^{b}	$\text{VI} + \text{S} = 2 \,.\, \text{IV} = \text{VIII} - \text{T}$	46.31622
Greater Seventh Minor	$\frac{9}{5}$	$\frac{3^2}{5}$	$\dot{7}^{b}$	$\text{VI} + \dot{\text{S}} = \text{V} + 3^{b} = \text{VIII} - t$	47.31622
Seventh Major	$\frac{15}{8}$	$\frac{3 \cdot 5}{2^3}$	VII	$\text{VI} + \text{T} = \text{VIII} - \text{S}$	50.60234
Diminiſhed Octave	$\frac{48}{25}$	$\frac{2^4 \cdot 3}{5^2}$		$\text{VII} + d = \text{VIII} - s$	52.51151
Superfluous Seventh	$\frac{125}{64}$	$\frac{5^3}{2^5}$		$\text{VII} + s = \text{VIII} - d$	53.88846
Octave	$\frac{2}{1}$	$\overset{2}{\cdot}$	VIII	$\text{VIII} = \text{V} + \text{IV}$	55.79763

The limma, apotome, trihemitone, ditonus, ſemidiapente, and tritonus, mentioned in this table, by the names of limma, apotome, &c. of the Greek ſcale, are ſuch as are either mentioned by the ancients, or at leaſt occur in their ſcale, where fourths are divided into two tones and a limma, and where the octave conſiſted of five tones and two limmas.

The term *redundant*, in the table, is applied to ſuch intervals as exceed the truth by a comma; and ſuch as fall ſhort of the truth by a like quantity, are called *deficient.* Intervals that exceed true diatonic intervals, by a ſemitone minor, are ſaid to be *ſuperfluous;* and thoſe which fall ſhort by the ſame quantity, are ſaid to be *diminiſhed.* Where an interval exceeds a true diatonic interval by the quantity of two ſemitones minor, we have called it an *extreme ſuperfluous* interval: and if it falls ſhort by the ſame quantity, the appellation of *extreme diminiſhed* interval is given it. Thus, if from A to D aſcending be a true fourth, and from D to *a* a true fifth, then if D be ſuppoſed raiſed by a comma, from A to $\dot{\text{D}}$ will be a redundant fourth, and from $\dot{\text{D}}$ to *a* a deficient fifth. From A to D ※ will be a ſuperfluous fourth, and from D ※ to *a* will be a diminiſhed fifth. In like manner, from A to D^{b}, will be a diminiſhed fourth; and from D^{b} to *a* a ſuperfluous fifth. From A to D ※※ (D double ſharp) will be an extreme ſuperfluous fourth, and from A to D^{bb} (D double flat) will be an extreme diminiſhed fourth. In like manner from D ※※ to *a* will be an extreme diminiſhed, and from D^{bb} to *a* an extreme ſuperfluous fifth. Such intervals are not to be met with in the practice of muſic; but if the diviſion of the octave into 31 parts were once eſtabliſhed, as it ought for the perfection of muſic, ſuch intervals as theſe here mentioned will neceſſarily occur in the ſcale. Vide Phil. Tranſ. N° 481. p. 273, 274. See Genus.

This table, among other uſes, will facilitate the examination of any propoſed ſcale, or interval. Suppoſe, for inſtance, it were required to examine ſome of Ptolemy's diviſions of the fourth, as his diatonicum molle, which he makes $\frac{8}{7} + \frac{10}{9} + \frac{21}{20} = \frac{4}{3}$. Take the logarithm of $\frac{8}{7}$ from the common tables, and divide it by the logarithm of $\frac{81}{80}$, the quotient will be 10.75, which gives the meaſure or number of commas, and its parts contained in an interval expreſſed by $\frac{8}{7}$. Look for the neareſt meaſure of intervals to 10.75 in the table, it will be found to be 10.39058, which anſwers to the interval of two ſemitones major, or of the diminiſhed third, as practitioners call it. But Ptolemy's exceeds this by 0.36, or about $\frac{1}{3}$d of a comma. The next interval in Ptolemy's diviſion is $\frac{10}{9}$, which is a true tone minor. The third is $\frac{21}{20}$, which will be found to be 3.93 commas, that is, a ſemitone minor and 0.64 of a comma, or a ſemitone minor redundant by near $\frac{2}{3}$ds of a comma. But this is much out of tune. In the common, and in Huygens's temperatures, the ſemitone minor is increaſed only by about $\frac{1}{4}$th of a comma. Vide Ptolemy's Harmon. p. 92. apud Wallis Opera, tom. v.

Intervals, *Concinnous*. Diſcords are diſtinguiſhed into *concinnous* and *inconcinnous* intervals: the *concinnous* are ſuch as are fit for muſic, next to, and in combination with concords; being neither very agreeable nor diſagreeable in themſelves; but having a good effect, as by their oppoſition they heighten the more eſſential principles of pleaſure; or as by their mixture and combination with them, they produce a variety neceſſary to our being better pleaſed. See Concinnous.

The other diſcords that are never uſed in muſic, are called *inconcinnous*.

Interval, *Diminiſhed*, is a defective interval, or an interval which is ſhort of its juſt quantity by a leſſer ſemitone. Thus from C ♮ to E being a third major, if E be lowered by a ſemitone minor, we ſhall have E ♭, and then from C ♮ to E ♭ is called a *diminiſhed* third, in the language of practical muſicians, and occurs frequently in their works. But, ſtrictly ſpeaking, in this caſe, the note E muſt be lowered more than a ſemitone minor.

Interval, *Harmonical*, is an interval, or difference of two ſounds which are agreeable to the ear, whether in conſonance or ſucceſſion.

Harmonical intervals, therefore, are the ſame with *concords*; which ſee.

They are thus called, as being the only eſſential ingredients of harmony.

Intervals, in the *New Method of Huſbandry*, denote the wide ſpaces, commonly about five feet, which are left between any two of the double, treble, or quadruple rows. See Husbandry.

Intervals, in the *Military Art*, are the ſpaces left between each regiment in camp, and likewiſe between each tent.

INTESTATE, a perſon who dies without making a will. An heir *ab inteſtato*, is a perſon who inherits an eſtate by ſome other right than that of will or teſtament.

Heretofore, thoſe who died inteſtate, were held infamous, and accurſed; in regard, by the canons of ſeveral councils, every perſon was enjoined to bequeath a part of his eſtate (and Matthew Paris ſays it was at leaſt to be a tenth part) to the church, for the ſafety of his ſoul; which a perſon who neglected to make a will, and to leave this legacy to the church, was judged to have abandoned. Several councils took on them to command the prieſts to ſolicit dying perſons to be charitable to the church; and this they did ſo earneſtly, that abſolution and the viaticum were denied to thoſe whom they could not prevail on; ſo that they made no difference between theſe inteſtates and ſelf-murderers; and they were alike denied Chriſtian burial. Du Cange adds, that all who died without abſolution, without receiving the viaticum, and without leaving alms to the church (even though they died ſuddenly), had their effects ſeized, and confiſcated to the uſe of the church, biſhop, &c. See Administrator and Testament.

In the Engliſh law there are two kinds of inteſtates: the one *de facto*, which are thoſe who make no will at all; the other *de jure*, called alſo *quaſi inteſtati*, which are thoſe who make a will; but ſuch an one as is null and void, either from the executors refuſing to act, or from ſome other cauſe: in which caſe they are judged to die as inteſtate, *quaſi inteſtati*.

And the 22 & 23 Car. II. c. 10. commonly called the ſtatute of diſtribution, appoints a diſtribution of inteſtates' eſtates, (except of femes covert, which are left as at common law, ſtat. 29 Car. II. c. 3. § 25.) after debts and funeral expences are paid among the wife and children of the deceaſed; or for want of ſuch, among the next of kin, &c. and the act of parliament doth immediately upon the death of the inteſtate veſt an intereſt in the perſons entitled: ſo that if any one dies before the diſtribution, though within the year, his ſhare ſhall go to his executors and adminiſtrators; and not to the ſurvivors or next of kin to the inteſtate. (1 Lil. Abr. 487. See Administration.) By this ſtatute the mother, as well as the father, ſucceeded to all the perſonal effects of their children who died inteſtate, and without wife or iſſue: in excluſion of the other ſons and daughters, the brothers and ſiſters of the deceaſed. And ſo the law ſtill remains with reſpect to the father; but by ſtatute 1 Jac. II. c. 17, if the father is dead, and any of the children die inteſtate without wife or iſſue, in the life-time of the mother, ſhe and each of the remaining children, or their repreſentatives, ſhall divide his effects in equal portions. See Custom *of* London.

By the ſame ſtatute it is enacted, that one-third part of the ſurpluſage of the eſtate of any perſon dying inteſtate, ſhall be diſtributed to his widow, and the reſidue amongſt his children by equal portions, or among ſuch perſons as legally repreſent his children, in caſe any of them be then dead, excepting ſuch child or children (not being heir at law) who ſhall have any eſtate by the ſettlement of the inteſtate, or ſhall be advanced by the inteſtate in his life-time, by portion or portions equal to the ſhare which ſhall by ſuch diſtribution be allotted to the other children, and in caſe their portions have not been equal, they ſhall be made ſo as nearly as poſſible out of the ſame ſurpluſage. But the heir at law is to have an equal part in the diſtribution with the reſt of the children, without any conſideration of the value of the land which he hath by deſcent or otherwiſe from the inteſtate. In caſe there be no children nor legal repreſentatives, one moiety of the ſaid eſtate ſhall be allotted to the widow of the inteſtate, and the reſidue diſtributed equally to every of the next kindred of the inteſtate, who are in equal degree, and thoſe who legally repreſent them ; provided that there be no repreſentations admitted among collaterals, after brothers and ſiſters children : and if there be no widow, the ſaid eſtate ſhall be wholly diſtributed in equal ſhares among the children ; or if there be no child, to the next of kindred in equal degree, and their legal repreſentatives. But no ſuch diſtribution of the goods of an inteſtate ſhould be made till after one year be fully expired after his death, and thoſe to whom diſtribution is made, are required to give bonds with ſufficient ſureties, to refund in caſe of debts.

This ſtatute of diſtributions bears a near reſemblance to our ancient Engliſh law, " de rationabili parte bonorum," which ſir Edward Coke himſelf (2 Inſt. 33.), though he doubted the generality of its reſtraint on the power of deviſing by will, held to be univerſally binding (in point of conſcience at leaſt) upon the adminiſtrator or executor, in the caſe of either a total or partial inteſtacy. It alſo bears ſome reſemblance to the Roman law of ſucceſſion " ab inteſtato ;" which, and becauſe the act was alſo penned by an eminent civilian (ſir Walter Walker), has occaſioned a notion that the parliament of England copied it from the Roman prætor, though it is little more than a reſtoration, with ſome refinements and regulations, of our old conſtitutional law ; which prevailed as an eſtabliſhed right and cuſtom from the time of king Canute downwards, many centuries before Juſtinian's laws were known or heard of in the weſtern parts of Europe. Judge Blackſtone obſerves, however, that the doctrine and limits of repreſentation, laid down in the ſtatute of diſtributions, ſeems to have been principally borrowed from the civil law ; whereby it will ſometimes happen that perſonal eſtates are divided " per capita," and ſometimes " per ſtirpes ;" whereas the common law knows no other rule of ſucceſſion but that " per ſtirpes" only. Bl. Com. b. ii.

INTESTINA, in the *Linnæan Syſtem*, an order or diviſion of worms (ſee VERMES) ; the characters of which are, that they are ſimple naked animals without limbs : ſome are pierced with a lateral hole or a kind of pore ; and others are imperforated and have no lateral pore. The ſubordinate genera of this diviſion of worms are the *aſcaris*, *trichocephalus*, *uncinaria*, *filaria*, *ſcolex*, *ligula*, *linguatala*, *ſtrongylus*, *echinorhynchus*, *hæruca*, *cucullanus*, *caryophyllæus*, *faſciola*, *myxine*, *tænia*, *furia*, *gordius*, *hirudo*, *lumbricus*, *ſipunculus*, and *planaria.*

INTESTINE MOTION. See MOTION.

INTESTINE *War.* See WAR.

INTESTINES, in *Anatomy*, are portions of the membranous tube, in which the converſion of the food into chyle, and the expulſion of its reſidue in the form of feces is effected. They are two in number, and are diſtinguiſhed by epithets derived from their relative ſize ; the *ſmall* inteſtine (*int. tenue*) ſucceeds the ſtomach, and is immediately followed by the *large* (*int. craſſum*). The uſe of the word in the plural, with either of theſe epithets, is incorrect ; ſince each of theſe diviſions of the alimentary canal is a ſingle tube.

The changes which the food undergoes in the ſtomach and inteſtines, and the functions of theſe organs, have been fully diſcuſſed under the article DIGESTION : at preſent our object is merely anatomical, and conſiſts in preſenting to the reader the details concerning the forms, ſituation, connections, and ſtructure of the inteſtines.

The ſmall inteſtine is that part of the alimentary canal which extends from the pylorus to the valve of the colon. It is the longeſt diviſion of the canal, and is ſuppoſed to be three or four times the length of the body. It is naturally divided into two parts : the firſt of theſe, placed between the two layers of the tranſverſe meſocolon, has a fixed ſituation in the abdominal cavity, and is called *duodenum :* the other floats looſely in the abdomen, and is diſtinguiſhed by an ambiguous and arbitrary diviſion into jejunum and ileum. It is generally, but not always, ſmaller in ſize than the large inteſtine ; yet, when it is diſtended with air or other contents, it exceeds the empty large inteſtine in diameter. The cells and folds of the latter give to its coats in the collapſed ſtate a feel of greater thickneſs, although they are not actually thicker than ſome parts of the ſmall inteſtines. A ſuperficial view would lead us to deſcribe it as a cylindrical tube ; but more accurate examination and actual meaſurement will ſhew that it is conical, largeſt at its commencement, ſmalleſt at its termination, and diminiſhing very gradually between theſe points. When diſtended, the outline of its ſection is circular : in the empty ſtate its ſides fall together, ſo that it repreſents an oblong oval.

The ſtructure of the tube is the ſame, in all eſſential points, throughout its whole extent ; and the diſtinctions of anatomiſts regard only points of ſituation and connection. The excretory tubes of the liver and pancreas open into the canal, near its beginning.

The *duodenum* is that part of the inteſtine included between the pylorus and the point at which the canal eſcapes from the tranſverſe meſocolon. It is placed in the neighbourhood of the vertebral column, between the two layers of the meſocolon, which are connected to it by a looſe cellular ſubſtance. The large end of the pancreas is very cloſely attached to it. From the pylorus it turns backwards, and to the right, under the neck of the gall-bladder, which touches it : hence it frequently has a yellow tint in the dead ſubject. This, which may be called the firſt portion of the duodenum, forms a diſtinct angle with the ſecond, which deſcends almoſt perpendicularly behind the upper layer of the meſocolon connected to it by a looſe cellular medium. Its poſterior ſurface correſponds to the right ſide of the vertebral column, and to the front of the right kidney : its inner edge to the pancreas. The third part makes a turn at the lower end of the kidney, or about the third lumbar vertebra, paſſes from right to left acroſs the vertebral column, in front of the aorta and vena cava, behind the ſuperior meſenteric veſſels, and below the pancreas. At the left ſide of the abdomen it again turns forwards and towards the right, eſcapes from behind the inferior layer of the meſocolon, and takes the name of jejunum. Thus this diviſion of the inteſtinal canal forms a kind of half circle, of which the convexity is towards the right, and the concavity to the left : the pancreas is included within it.

The anterior ſurface of the inteſtine only is covered by peritoneum ; the poſterior aſpect being attached to the neighbouring organs by cellular ſubſtance. In the part near the pylorus, the covering membrane adheres cloſely to the muſcular part of the inteſtine, as it does in the jejunum or ileum : but in the reſt of its courſe, the adheſion is much more looſe, and in the third portion the meſenteric veſſels are interpoſed between the membrane and the inteſtine. A fold of membrane produced from the neighbourhood of the right kidney, and from the tranſverſe fiſſure of the liver, is ſometimes deſcribed as the ligamentum duodeni renale or hepaticum : the reſt of the canal is included within the ſpace left between the layers of the meſocolon.

Its length is about that of twelve fingers' breadths. The united pancreatic and biliary ducts have their opening on the poſterior ſurface, at the angle formed between the firſt and ſecond portions of the duodenum.

The peculiarities of the duodenum are its incomplete peritoneal covering ; its circumſcribed and fixed ſituation ;

its connection to the pancreas, and receiving the ſecreted fluid of that gland and the liver. Its figure is perhaps leſs regularly cylindrical, and there are ſome differences in the mucous membrane.

The arteries of the duodenum are derived from the gaſtroduodenal branch of the hepatic, and from the ſuperior meſenteric: the veins join ſome of the trunks, which contributed to the formation of the vena portarum. The abſorbing veſſels paſs to the glands at the root of the meſentery. The nerves come from the cæliac ganglia.

Second Diviſion of the ſmall Inteſtines.—This part of the canal, which is very looſe and moveable, forms numerous turns, and its convolutions fill up the ſpace between the bladder and uterus below, and the large inteſtine above and at the ſides: the latter part almoſt encircles the ſpace in which this diviſion of the canal lies. As the cæcum and the ſigmoid flexures of the colon do not touch below, the ſmall inteſtine deſcends in their interval, in greater or leſs quantity, into the pelvis. The umbilical and hypogaſtric regions of the abdomen are chiefly occupied by theſe convolutions: which accommodate themſelves, by their perfect mobility, to the numerous changes produced in this ſpace. A diſtended ſtate of the ſtomach cauſes them to deſcend: when the bladder, rectum, and uterus are empty, much of the inteſtine is found in the pelvis; but when theſe organs, and particularly the latter, are diſtended, the inteſtine aſcends: in a word, it paſſes into any ſpace that remains open for it. The tranſverſe arch of the colon bounds the ſpace occupied by the ſmall inteſtine above: the lumbar portions of the large inteſtine, fixed to the back of the abdomen, allow the convolutions to paſs in front of them, and to correſpond immediately to the abdominal parietes. The latter limit and confine it in front, and are ſeparated from it only by the great omentum.

A broad fold of peritoneum, called the meſentery, connects it in its ſituation to the abdominal cavity; this conſiſts of two layers, which receive the inteſtine between them, and give it a ſmooth external coat. This fold is attached to the back of the abdomen, in an oblique line, extending from the left lumbar to the right iliac regions: here it is about ſix inches broad. It expands ſo conſiderably as to be broad enough on the oppoſite or front margin, to be attached to the whole length of the jejunum and ileum. In conſequence of this great breadth of the anterior part, the meſentery itſelf, in this ſituation, forms a vaſt number of longitudinal plaits. The flat ſurfaces of the meſentery are ſmooth, and contiguous to the inteſtinal convolutions. The depth of the meſentery, from its poſterior or fixed, to its anterior or looſe edge, is greateſt in the middle, and gradually diminiſhed towards either end. Its ſtructure and attachments are ſuch as to preſerve the inteſtinal convolutions in a certain relative poſition, and at the ſame time to allow in the whole a conſiderable liberty of motion; it prevents the inteſtines alſo from becoming entangled in the motions of its individual parts.

It is compoſed of two membranous layers, produced from the peritoneum. The latter membrane, after lining the poſterior and right portion of the abdomen, when it arrives at the root of the meſentery, is reflected from behind forwards, inſtead of being continued to the left ſide. That, which has lined the poſterior and left diviſion of the cavity, is alſo reflected from behind forwards, inſtead of paſſing in front of the vertebræ. Theſe laminæ, turned towards each other, form the two ſurfaces of the meſentery; they ſeparate at the inteſtine, and leave a cylindrical tube, in which that canal is contained. They are connected by a layer of cellular membrane, containing more or leſs fat, and the arteries, veins, and nerves of the jejunum and ileum, as well as the lacteal veſſels and their glands.

The inteſtinal convolutions have no fixed ſituation, but are formed, deſtroyed, and renewed, carried upwards, downwards, &c. according to the general or particular motions of the canal: yet the concavity of each turn is always at the meſenteric edge, and its convexity at the looſe margin of the gut. The very looſe attachment to the ſides of the cavity, and the apparently irregular order in which the convolutions of the inteſtines are diſpoſed, ſeem at firſt ſight to prevent us from aſſigning any particular direction to this part of the canal. But if we put out of the queſtion the great maſs of the turns, and examine the parts where it begins and ends, and conſider at the ſame time the direction of the meſentery, we ſhall find that the canal altogether paſſes obliquely from above downwards, and from the left towards the right ſide. It begins in fact on the left ſide of the tranſverſe meſocolon below the ſuperior meſenteric veſſels, and it terminates in the right iliac region, where it is fixed to the ſide of the cæcum.

A tranſverſe ſection of the inteſtine preſents an elliptical area; of which the ſmaller circle correſponds to the meſentery, and the larger to the looſe edge of the inteſtine. Conſidered in its whole length, the meſenteric or attached edge is concave; the looſe margin convex. The ſmall trunks of the blood-veſſels enter on the former; their minute ramifications, and the fine origins of the abſorbents, are obſerved on the latter.

Sometimes ſmall blind proceſſes, or appendices, varying in length from a few lines to three or four inches, are connected to the ſmall inteſtine. It is very uncommon to ſee more than one in a ſubject. They are cylindrical or conical towards the extremity, communicate freely with the reſt of the canal, and completely agree with it in ſtructure. There can be no doubt that they are originally formed parts, and not produced by any morbid extenſion of the inteſtinal parietes. They are often mentioned under the name of diverticula.

When moderately diſtended, the inteſtine meaſures more than an inch at its largeſt diameter, and leſs at the ſmalleſt. When it is completely diſtended, the figure is circular.

The coats are thinner than in the ſtomach or in the large inteſtine: they are thickeſt at the beginning, and grow gradually thinner to the end. They appear proportionally thicker, when the inteſtine is in a contracted ſtate. It is more fleſhy, elaſtic, and dark coloured; in a word, firmer and thicker in perfectly healthy men than in women or valetudinarians. When it is aſſerted that the canal is ſo many times the length of the body, we only mean to give a general notion of its extent: for there is no relation between the ſtature of individuals and the volume of their gaſtric viſcera.

The diſtinction of the jejunum and ileum is quite arbitrary: there are no marks ſhewing the termination of one, and the beginning of the other: but the two ends of the canal differ obviouſly in ſeveral points. Winſlow gives the former name to the upper two-fifths of the tube, and the latter to the lower three-fifths.

Organization of the ſmall Inteſtine.—It conſiſts, like the ſtomach, of three diſtinct ſtrata or coats, connected by cellular ſubſtance: theſe are moſt clearly ſeen on the cut edge of the part, after a ſimple inciſion, when the difference of colour and denſity enables us to diſtinguiſh them eaſily. Boiling and maceration in proof ſpirit render the diſſection of the inteſtinal coats more eaſy.

The firſt or external coat is a ſerous membrane, conſiſting of a production of peritoneum. The two layers of the meſentery ſeparate at the concave edge of the inteſtine, ſurround it, and are continued into each other at the convex ſide. It covers, therefore, the whole external ſurface, excepting the narrow ſtrip where the two layers are ſeparated.

This ſerous membrane is very thin, ſo as to be nearly tranſparent, and poſſeſſes no fibres: the muſcular fibres and the blood-veſſels can be ſeen through it. Its external ſurface is moiſt, and perfectly ſmooth; while the internal, connected to the ſubjacent fibres by cellular ſubſtance, has a rough appearance.

The muſcular or ſecond coat of the inteſtine conſiſts of two ſtrata of fibres. The external, which is thin and ſmall, has a longitudinal direction, but their fibres can hardly be ſeen except at the convex edge of the gut. The internal is much more conſiderable; its fibres are more numerous, and they ſurround the inteſtine in a circular manner, ſo as to cut the former at right angles. Theſe fibres are the moſt diſtinctly marked about the duodenum: they grow more ſlender, poſſeſs leſs colour, and are therefore hardly obſervable near the valve of the colon.

The third or internal covering is a mucous membrane, generally called by anatomiſts the villous coat of the inteſtine: it is always covered in a greater or leſs degree with a mucous fluid. This is connected to the muſcular ſtratum by a very copious, white, and rather looſe cellular ſubſtance, the *nervous* coat of many anatomiſts. The trunks of the blood-veſſels and abſorbents of the mucous ſurface are contained in this in great numbers, and give to it the appearance of conſiderable vaſcularity. It not only connects the mucous and muſcular coverings together, but alſo unites the duplicatures of the former. Through the intervals of the muſcular fibres it joins the cellular ſubſtance connecting the ſerous and muſcular coats. When carefully ſeparated, it has the appearance of a fine cotton on both ſurfaces: and this appearance may be ſtill more ſtrikingly produced by cutting off the meſentery cloſe to the inteſtine, inverting the tube and inflating it forcibly, when the air will penetrate into the whole cellular ſtructure of the organ. If the part be macerated, after ſeparating by diſſection the mucous and muſcular coats, the water diſtends the cells and exhibits the ſtructure very clearly.

The mucous membrane is much longer than the two other coats, and it is conſequently collected, throughout the whole canal, into folds, by which the difference of length is compenſated. Theſe are not like the rugæ of the ſtomach, formed only in the contracted, and diſappearing in the diſtended ſtate of the organ; but they belong to the eſſential ſtructure of the part, and exiſt therefore under all circumſtances. They are moſtly tranſverſe in their direction; that is, they cut the long axis of the gut at right angles; and they are called valvulæ conniventes, although they have not, nor can poſſibly exert any thing like the action of a valve. They begin about an inch from the pylorus, are ſmall, and longitudinally diſpoſed in the duodenum. They then aſſume a more regular arrangement, are numerous and large, and nearly parallel; towards the end of the inteſtine they gradually become ſmaller and fewer, and have again in great part of the ileum a longitudinal diſpoſition. Near the valve of the colon the gut is almoſt ſmooth.

The valvulæ conniventes may occupy from one to three-fourths of the diameter of the canal, but rarely extend through the whole circle: they are often joined by ſmall communicating folds, and frequently are bifurcated at their extremities. When ſhort, they are narrow, and are broader in proportion as they are longer: they are broadeſt in the middle and narrower at the extremities. Their breadth may be from half a line to three lines. They are ſo completely unreſiſting, that they yield readily in either direction to any impelling force, and are applied againſt the ſurface of the canal. As they depend entirely on the cellular ſubſtance, they are deſtroyed by ſeparating the mucous membrane and drawing it out: the ſurface then becomes ſmooth, and very much exceeds the length of the other coats.

The ſituation, length and breadth, direction, number and form of the valvulæ conniventes, can be very well obſerved in a gut inflated and dried; but their natural appearance, their thickneſs, ſoftneſs, &c. are beſt ſeen in an inverted inteſtine floating in water.

When the ſurface of the mucous membrane is attentively examined, it is found univerſally covered with very delicate and minute folds and projections, ſo as to give it a flocculent appearance; theſe are named villi. They are more numerous and large in the commencement of the canal, and decreaſe in number and ſize towards the oppoſite end. In ſome animals, as the dog, theſe villi are remarkably long and numerous, ſo that the ſurface of the mucous membrane completely reſembles velvet.

When the blood-veſſels have been ſucceſsfully injected, microſcopical examination diſcovers other irregularities on theſe villi, and ſhews us that the whole conſiſts of a cloſe net-work of vaſcular communications. Each villus contains moreover numerous abſorbing veſſels, ſo that they have been regarded as the great organs of abſorption, containing the mouths by which the lacteals take up the chyle from the inteſtine. Anatomiſts have buſied themſelves much with attempts to detect the actual openings of the lacteals upon the villi. Lieberkuhn thought that he could ſee, by the aid of the microſcope, an opening into each villus leading into a ſmall veſicular cavity in the centre, which he called the ampulla. Hewſon did not admit this ſtructure, but conceived that the veſſels begin by ſimple apertures, in the number of one or more on each villus. Mr. Cruikſhanck met with a ſubject, in which the lacteals and villi were remarkably loaded with chyle, and he examined theſe parts with the microſcope. Many of the villi were ſo full that they ſeemed like white veſicles, without any diſtinction of particular veſſels. "In ſome hundred villi," ſays he, "I ſaw a trunk of a lacteal, forming or beginning by radiated branches. The orifices of theſe radii were very diſtinct on the ſurface of the villus, as well as the radii themſelves, ſeen through the external ſurface, paſſing into the trunk of the lacteal: they were full of a white fluid. There was but one of theſe trunks in each villus. The orifices on the villi of the jejunum, as doctor Hunter himſelf ſaid, (when I aſked him, as he viewed them in the microſcope, how many he thought there might be,) were about fifteen or twenty on each villus: and in ſome I ſaw them ſtill more numerous." Anatomy of the Abſorbing Veſſels, chap. 11, and plate 2.

It has been calculated, that the ſurface of this mucous membrane, when allowance is made for all its inequalities, exceeds that of the common integuments.

Numerous mucous glands are ſituated on the external ſurface of the mucous membrane of the ſmall inteſtine: their ducts open on the internal ſurface of the organ. Theſe parts are always ſmall, and in many caſes are not demonſtrated without ſome difficulty. They are moſt advantageouſly examined by ſlitting up the gut, and holding it againſt the light; they are diſtinguiſhed by their comparative opacity. Several exiſt in the duodenum; in the jejunum they are fewer, but they increaſe in number again in the ileum, are collected into conſiderable maſſes, and are particularly numerous towards the end of the inteſtine. They vary in ſize: ſome are rounded, others compreſſed; the larger are generally placed ſingly, the ſmaller are placed cloſe together in collections of different extent. The openings of the excretory ducts of the larger ones on the mucous ſurface of the inteſtine are ſufficiently conſpicuous. They ſeem to poſſeſs a very ſimple ſtructure; we can obſerve in them merely a net-work of minute vaſcular ramifications, which depoſit their ſecreted mucus in a ſimple excretory tube.

According as theſe bodies are found ſingle, or in collections, they have been called glandulæ *ſolitariæ* or *agminatæ*. Again, they have been named in different parts, after perſons who firſt deſcribed them, glandulæ Peyeri and Brunneri.

The arteries of the jejunum and ileum are derived from the trunk of the ſuperior meſenteric: the veins all end in the meſenteric root of the vena portarum. The blood in theſe veins has been obſerved to have white ſtreaks in it; but this is not peculiar to the meſenteric veſſels. Fluids injected into the meſenteric veins eaſily tranſude on the mucous ſurface of the inteſtine.

The ſuperficial abſorbing veſſels have their origin in the ſerous membrane, anaſtomoſe very frequently with each other, and with the deepſeated ones, paſs through the meſentery in a ſuperior and inferior ſet, and enter the meſenteric glands. The deeper-ſeated abſorbents, ariſing from the villi of the mucous ſurface, are called the lacteal or chyliferous veſſels; they are often diſtended in a varicoſe manner to a conſiderable ſize: their trunks accompany thoſe of the blood-veſſels in the cellular ſubſtance on the ſurface of the mucous membrane, anaſtomoſe very frequently with each other, and with the ſuperficial ones, both here and in the meſentery, ſo as to form a complete net-work, and then proceed to the glands. They are very numerous in the duodenum and jejunum; but are fewer in the reſt of the canal; they form a plexus in the meſentery, proceed from gland to gland, becoming larger and larger, and ſtill communicating together. Collected into large trunks, they arrive at the under and back ſurface of the pancreas, and are united with the abſorbing veſſels of the ſtomach, ſpleen, and liver in the glands and plexuſes ſituated about this part. They then bend downwards, forming new plexuſes, and arrive at the glands placed about the aorta, uniting with all the trunks from the other abdominal viſcera, from the pelvis and lower extremities: they then aſcend again to terminate in the thoracic duct.

The meſenteric glands, amounting in number to one hundred or more, even to one hundred and fifty, are chiefly placed on the ſuperior meſenteric artery, either ſcattered and ſeparated, or in a more cloſe arrangement. They are fewer and ſmaller towards the lower part and right portion of the meſentery and inteſtine, than on the upper and left part. They are moſtly flattened, with a round or oval circumference: and the larger are placed irregularly among the ſmall ones. They have a browniſh red colour, but are paler and ſmaller in adults than in infants. When full of chyle they are whiter.

The nerves of the ſmall inteſtine are derived from the cæliac ganglia; they form net-works adhering very cloſely to the arteries. The animal ſenſibility of the inteſtines is probably very ſlight under ordinary circumſtances; the functions of theſe parts are performed without our conſciouſneſs. Diſeaſe, however, develops a moſt acute animal ſenſibility. Animal contractility is entirely deficient: no exertion of the will can either accelerate or retard the action of the inteſtine. But the moſt ſtriking phenomena of the inteſtinal functions are derived from their organic ſenſible contractility, which reſides in their muſcular coat; theſe may be witneſſed in living animals by expoſing the abdomen, or in thoſe recently dead, and ſometimes in the inteſtines expoſed by accident or ſurgical operations. The whole canal is obſerved to be in motion, and this is called *periſtaltic*, which term ſignifies merely contracting. One part of the tube is ſeen to be contracted, while another is dilated; one aſcends, while another deſcends; one is extended, another rendered ſhorter: thus a general twiſting and creeping is produced, compared to the motion of worms, and hence called *vermicular*. Touch a part of the gut with a ſharp inſtrument, or with any chemical ſtimulus, and it will be ſo contracted as to cloſe the canal. A ſimilar effect follows the application of ſtimuli, ſuch as air, or other fluids, to the internal ſurface. This is not confined to the mere ſpot irritated, but the neighbouring parts partake of the affection. This ſenſibility continues ſome time after death, and is manifeſted even in the inteſtine when removed from the body.

The ordinary and natural ſtimuli, by which the organic contractility of the inteſtine is excited, are, the chyme or aliment as it comes from the ſtomach, the air mixed with and accompanying this, and the bile. The artificial and unuſual ones are purgative medicines, worms, cold applied to the abdomen. Cold to the feet, and terror ſometimes act ſympathetically.

Phyſiologiſts have diſtinguiſhed three kinds of motion in the inteſtine; the deſcending or regular one, proceeding from the ſtomach to the large inteſtine; the aſcending or inverted, the reverſe of the former; and the mixed, which partakes of both theſe.

The following phenomena may be obſerved in the motion of the inteſtine. Parts of the canal are alternately diſtended and contracted; moved in various directions; rendered tenſe and looſe to the touch; diſtended with air or chyme; incurvated or extended; appear longer or ſhorter according as the longitudinal or circular fibres act; are filled or emptied; in ſhort, they are alternately at reſt and in motion.

The longitudinal fibres ſhorten the canal lengthwiſe: the circular ones produce an oppoſite effect. The latter admit of diſtention, until the gut exceeds an inch in diameter; they contract it again to half a line, or even cloſe the canal entirely.

The antiperiſtaltic action ſeems juſt ſufficient in degree, in a healthy animal, to retain the chyle for the action of the abſorbing veſſels. In diſeaſes, or when an inſuperable obſtacle exiſts to the natural paſſage of the aliment, this inverted motion is carried to a great degree, ſo that the contents of the ſmall and even large inteſtine are conveyed into the ſtomach, and expelled by vomiting.

The *large inteſtine* is that portion of the alimentary canal, which extends from the end of the ſmall inteſtine to the anus, and is ſo named becauſe its diameter conſiderably exceeds that of the ſmall. It is diſtinguiſhed from the latter, not merely by its ſituation, connections, external form and functions, but alſo in its minute ſtructure, ſo that a very ſmall portion of it might be diſtinguiſhed from a ſimilar piece of the ſtomach or ſmall inteſtine.

Its ſituation is more defined and conſtant than that of the ſmall inteſtine. Beginning in the right iliac region, it riſes in front of the right kidney, goes backwards under the liver, and then turns forwards and towards the left (the firſt or hepatic flexure of the colon). It continues in a tranſverſe direction, from right to left, under the gall-bladder, the ſtomach, and the notch of the ſpleen, below and behind which it turns again, and forms a large angle (the ſecond or ſplenic flexure). It deſcends on the left ſide of the abdomen, in front of the left kidney, forms in the left iliac region a large a large and looſe fold, reſembling in its form the letter S; paſſes over the left ſacro-iliac ſymphyſis into the pelvis, runs along the concave ſurface of the ſacrum and os coccygis, and ends a little beyond the anterior extremity of that bone, at the anus.

We may diſtinguiſh ſix portions of the large inteſtine: 1, the *cæcal*, which is commonly named ſimply the cæcum: 2, the vermiform, ordinarily called proceſſus or appendix vermiformis cæci: 3, the *right* part of the colon, or the aſcending portion: 4, the *tranſverſe* part, or the arch: 5, the left part, including the deſcending colon and the ſigmoid or iliac flexure of the gut: 6, the *rectum*. Very commonly the tube is divided into the three parts, cæcum, colon, and rectum. Theſe different names, as in the ſmall inteſtine, have led to the employment of the phraſe large *inteſtines* in the plural, as if there were more than one tube.

We cannot aſſign any exact limits to theſe diviſions, as the poſition of the inteſtine, on which they are founded, varies in its different ſtates of diſtention or emptineſs. The right colon deſcends lower, and appears longer when it is full than when empty. The tranſverſe portion, when filled, may deſcend, from the looſeneſs of its attachment, to the umbilicus or pelvis: if it be longer than uſual, it forms an arch with the concavity upwards, or it may make one or two turns. When removed from the body, all diſtinction of particular diviſions is loſt, and the gut forms a ſtraight uninterrupted tube. It is from three to five times ſhorter than the ſmall inteſtine, and they are to each other nearly as five to twenty-five. In individuals of good proportions it meaſures about ſeven feet. The connections of the inteſtine are more firm in ſome ſituations, and more looſe in others. In many parts the peritoneum does not entirely ſurround the tube, but covers its anterior portion only, leaving the poſterior part to be affixed by cellular ſubſtance to the contiguous organs. The term meſocolon is applied generally to the peritoneum covering the large inteſtine.

The meſocolon dextrum paſſes from the under and back part of the liver, from the apex of the laſt rib, from the right quadratus lumborum, and iliacus internus, in front of the right colon and cæcum. Thus theſe parts, which are only covered on their anterior ſurface, are firmly bound to the iliac muſcle, the kidney, liver, and duodenum, and conſtantly held in this ſituation. The appendix has its peculiar ſmall and falciform meſentery.

The tranſverſe meſocolon is a broad and looſe fold, by which the tranſverſe part of the inteſtine is uniformly covered, except juſt at the ſeparation of its two laminæ. The left meſocolon is inflected towards the right, nearly at a right angle, and is then continued behind and below the ſtomach and liver, in a tranſverſe direction to the left kidney, under the name of meſocolon tranſverſum. Together with the arch of the colon, it forms a kind of tranſverſe partition or diaphragm, looſe at the anterior edge, and ſeparating the ſtomach, duodenum, ſpleen, and liver from the other abdominal contents. It is generally horizontal, as its name denotes; but it is ſometimes ſo broad and long as to deſcend with the inteſtine into the pelvis. It is made up of two laminæ of peritoneum, including between them, beſides the blood-veſſels, the abſorbents with their glands, and the nerves of the inteſtine, connected and covered by more or leſs fat, the duodenum, and pancreas. The latter parts are placed quite at the root of the fold.

The upper lamina deſcends from the ſplenic fold of the peritoneum, the pancreas, the upper lumbar vertebræ, the external covering of the duodenum, and the neighbourhood of the kidney and vena cava. The inferior lamina, which is more ſimple and ſtrong, comes on the left from the ſituation under the ſpleen, where it ſurrounds the duodenum by a kind of ſemilunar fold; then from the right kidney, and from a fold placed between the liver and kidney.

The breadth of this meſocolon leaves the arch of the inteſtine quite moveable, ſo that its ſituation is by no means conſtant; the diſtended ſtomach puſhes it downwards, and the repletion of the ſmall inteſtine has the contrary effect. The great omentum covers the front of the tranſverſe colon, and paſſes between this and the ſtomach: but does not tend at all to fix it.

The meſocolon ſiniſtrum is continued over the inteſtine, from the iliac veſſels and pſoas magnus to the left kidney: covering only the anterior ſurface. The back of the inteſtine is connected by cellular ſubſtance to the diaphragm, the pſoas, and the kidney, ſo that its ſituation is very fixed. Sometimes, however, there is ſomething like a meſentery belonging to this part of the tube.

The meſorectum is a duplicature, varying in breadth, produced from the ſide of the pelvis to the ſigmoid flexure of the colon, and the commencement of the rectum. It is broadeſt above, where it is continuous with the meſocolon ſiniſtrum, and ends in an acute point below. It is made up, like the meſentery, of two laminæ of peritoneum, including between them the blood-veſſels, &c. of the inteſtine, and fat, and ſeparating to cover the rectum. It allows the inteſtine a conſiderable liberty of motion. Below the termination of the meſorectum, the gut has no peritoneal coat; but is united by cellular ſubſtance to the ſurrounding organs: that is, to the ſacrum and os coccygis, to the vagina in the female, to the bladder and proſtate in the male. Its extremity is ſtill further fixed by the attachment of the muſcles of the anus, and by its continuity with the common integuments.

The diameter of the tube, when moderately diſtended, is about two inches or two and a half.

The ileum deſcends gently to the right iliacus internus muſcle, and is inſerted obliquely into the left and poſterior ſide of the large inteſtine, between the cæcum and right colon, having its muſcular and mucous coats continuous with thoſe of the large inteſtine. This extremity of the ſmall inteſtine forms an acute angle with the cæcum, and a right angle with the colon: its upper half is placed tranſverſely, the lower aſcends. On opening the large inteſtine, we find the communication to be of a valvular nature, and compoſed of two folds (*alæ* or *labia*), a ſuperior and an inferior one: it is prominent, ſoft, and of courſe moveable. Each of theſe folds is compoſed of a ſmaller internal lamina, which is the mucous lining of the ſmall inteſtine, and an external larger one, compoſed by the correſponding coat of the large. Theſe laminæ, connected by cellular ſubſtance, and continuous with each other at the ſides of the opening, form the valvula coli (valvula ilii, or ileo-colica, or ileo-cæcalis). The ſuperior fold, placed nearly tranſverſely, is ſhorter and narrower than the inferior, which riſes the higheſt of the two. A kind of ſtricture or fold of the large inteſtine bounds the valve on each ſide. Between the two folds compoſing this valve, the orifice of the ſmall inteſtine opens tranſverſely; its figure is an oblong oval, and its dimenſions are much leſs than the diameter of the ileum. The length and breadth of the folds, and conſequently the ſize of the interpoſed aperture, vary greatly. Sometimes the lower fold is very long and broad, the upper ſhort and narrow, ſo that the inteſtine opens obliquely by a very ſmall aperture. This ſtructure admits of the opening being very completely cloſed. Sometimes both folds are but ſlightly prominent, and their diſtinction not clearly marked. Here the opening is more nearly circular, and cannot be ſo perfectly ſhut.

The external or peritoneal coat paſſes over the communication between the two inteſtines, with a ſmooth ſurface, making no fold, and confining the parts in their relative ſituation to each other. The muſcular and mucous coats, and the cellular ſubſtance of the two inteſtines, are continuous, and this continuity retains the folds of the valve in their ſituation. When the peritoneum and muſcular parts are cut through, the mucous lining which forms the valve is no longer retained; the ileum may be withdrawn from the colon, the two folds being deſtroyed, the communication has a circular appearance, and its dimenſions are equal to thoſe of the ſmall inteſtine.

The ſtructure of this part is moſt advantageouſly obſerved by diſſecting it under water. When the inteſtine is inflated and dried, the general figure and direction of the two folds, and of the aperture between them, can be clearly ſeen: but they are rendered rigid, ſmooth, and ſhorter than is natural, and their margins are too far ſeparated.

As the two folds, which compoſe the valvula coli, repreſent two oblique planes, converging in ſuch a manner as to form a convexity towards the large, and a concavity towards the ſmall inteſtine, whatever preſſes againſt them in the concave ſurface will ſeparate them, and open more widely the interval between them: whatever comes againſt them on their convex aſpect will approximate them, and tend to deſtroy the opening. The contents of the ileum, paſſing in their natural courſe, are in the former caſe; and thoſe of the colon in the latter. Hence they prevent the admiſſion of feces into the ſmall inteſtine; as we can generally prove by diſtending the large inteſtine with air or water: thoſe fluids do not eſcape by the ileum. Yet this experiment does not always ſucceed perfectly: and probably under particular circumſtances in the living body, a retrograde paſſage takes place: hence vomiting of feces and of matters thrown up in clyſters. We muſt recollect, in arguing from the reſult of trials with air or water, that the feces, of which the return is prevented, poſſeſs uſually conſiderable conſiſtence.

The large inteſtine is compoſed of three coats or layers of the ſame nature, and diſtinguiſhed by the ſame names as thoſe of the ſmall.

The external, or ſerous covering, according to what we have ſaid concerning the connections of the organs, is a partial one in ſome diviſions of the tube. This is elevated at intervals into ſmall proceſſes, containing fat, and completely reſembling portions of omentum. For an account of theſe parts, which are called appendices epiploicæ, and are peculiar to the large inteſtine, ſee Epiploon.

The muſcular covering of the inteſtine is made up of two orders of fibres: thoſe of the interior ſtratum are circular, and uniformly extended over the mucous membrane, as in the ſmall inteſtine: they are connected to that coat by a ſimilar copious cellular ſubſtance, deſcribed often as a nervous coat. The longitudinal fibres are collected into three bands having the appearance of ligaments, and placed at equal diſtances from each other on the ſurface of the tube. Theſe bands are much ſhorter than the other coverings, which are therefore puckered up and form cells between them. The three commence at one point about the appendix vermiformis, diverge and grow broader as they aſcend over the cæcum: are continued through the whole length of the colon; grow broader and ſtronger on the rectum, and are united into a continuous muſcular ſheath, including about the ſix laſt niches of the gut. One band is on the unattached part of the inteſtine: another is covered on the arch by the omentum; and the third is found at the attachment of the meſocolon. The ſurface is level, tenſe, and rather depreſſed in the ſituations occupied by theſe bands; in their intervals the ſurface conſiſts of a ſeries of elevations, ſeparated by tranſverſe folds, the cells being ſo placed as to cut the long axis of the gut at right angles: externally, therefore, the tube ſeems made up of a triple ſeries of hemiſpherical elevations, internally of the ſame number of rows of cells. This appearance is peculiar to the large inteſtine: it exiſts no longer in the rectum, where the bands are united into an uniform ſtratum.

The ſerous and mucous coats with the circular fibres are ſo plaitable in conſequence of the arrangement juſt deſcribed, as to form on the inſide very conſiderable tranſverſe folds: theſe are largeſt at the beginning of the tube, become ſmaller, and are entirely loſt in the rectum. The folds are of different ſizes, and variouſly intermixed: between two of them a cell is formed of an elliptical figure, narrower at its oblong orifice, and larger about the middle. If the inteſtine be inflated, and the longitudinal bands cut through in ſeveral parts, the whole inteſtine may be extended into a much greater length, the folds and cells diſappear, and the tube becomes nearly cylindrical.

The mucous coat forms various folds in the cells of the inteſtines when in its contracted ſtate, ſimilar to the folds occurring in the ſtomach: they diſappear on diſtention. Its ſoft and pulpy ſurface is covered with a tenacious mucus. It differs from that of the ſmall inteſtine in poſſeſſing no villi. Numerous ſingle mucous glands are found over the whole large inteſtine: they lie on the outer ſurface of the mucous coat, which is penetrated by their ducts.

The arteries of the large inteſtine come from the ſuperior and inferior meſenteric trunks; the veins join the inferior meſenteric branch of the vena portarum. The abſorbents, both ſuperficial and deepſeated, paſs through glands which lie cloſe to the inteſtine: theſe are ſmaller than the meſenteric glands, and fewer in number, being reckoned from 25 to 50, and are nearer to the gut. After paſſing through ſeveral of them, the abſorbents terminate, near the kidneys, inferior meſenteric artery and pancreas, in the ſame glands at which the lacteal veſſels of the ſmall inteſtine arrive. They are, on the whole, much fewer and ſmaller than thoſe of the ſmall inteſtine.

The nerves come from the plexuſes of the great ſympathetics, and from the ſeveral branches, and are connected to the arteries. The end of the large inteſtine is a point at which the organic and animal lives are united; here we have very obvious animal ſenſibility, and the muſcular actions are conſiderably influenced by the will. Where the ſmall inteſtine joins the large, the latter is produced, below the opening of communication, into an obtuſely conical proceſs, two or three inches in length, having the ſame unequal ſurface as the reſt of the tube, and terminating in a blind extremity; this is the part called the cæcum. Uſually this is larger in ſize than the continuation of the tube, and has been therefore called caput coli. It is covered almoſt entirely by peritoneum, but is connected on its right ſide, for a ſmall extent, to the iliacus internus, by cellular ſubſtance. It varies much in ſize, form, and poſition; ſometimes it is ſcarcely one inch, ſometimes nearly four in length. It may be larger or ſmaller, more or leſs irregular on the ſurface, &c.

From the poſterior part of the cæcum, a ſmall inteſtine, about the ſize of a quill, cylindrical in its figure, and terminating after one or two turns in a rounded and blind extremity, is continued obliquely towards the left. This is the appendix vermiformis. It is rather larger at its commencement than in its progreſs, and is held by a ſmall fold of peritoneum, like a meſentery. Its coats contain numerous mucous glands, and its cavity, which communicates freely with that of the cæcum, is generally filled with a thickiſh mucous fluid. It ſeldom contains feces in the adult. Its length, ſize, figure, and direction vary greatly: it may be from one to ſix long, and from one to three lines broad. It very frequently adheres to the ſurrounding parts.

The rectum deſcends in an arched courſe, of which the convexity is turned downwards and backwards, from the laſt lumbar vertebra to the anus. Its curve is moſt clearly obſerved when the part is conſidered in a lateral view. In the infant, on account of the ſmall ſize of the pelvis, it is continued for the greateſt part in the abdomen. Its external ſurface is uniform. The peritoneal covering is a partial one, and belongs only to the ſides and anterior part of the inteſtine: behind it is connected to the pelvis by cellular ſubſtance. This membrane forms two lateral folds, continued, in the male ſex, to the ſides of the bladder; in the female to the vagina and the poſterior ſurface of the broad ligaments of the uterus. From the anterior part of the inteſtine the peritoneum paſſes in men to the poſterior and inferior part of the bladder, and in women to the under ſurface of the vagina. Beyond this point the inteſtine is continued, ſtill in a curved courſe, with the convexity downwards, for an inch or more, united by cellular ſubſtance in the male ſubject to the veſiculæ ſeminales, urinary bladder and proſtate, in the female to the vagina. The ſerous coat has appendices epiploicæ.

The muſcular covering conſiſts of a thick and ſtrong layer of longitudinal fibres, and of a ſtrong ſtratum of circular ones: the latter form an oval tumid ring at the end of the gut, called the ſphincter ani internus.

The cellular ſubſtance is continued, at the end of the gut, into the general ſubcutaneous ſtratum; and the mucous lining is gradually, and in the European imperceptibly, loſt in the common integuments. But in the negro the boundary is more clearly marked by the ceſſation of the black rete mucoſum.

The mucous coat is marked with longitudinal ſerpentine folds, and covered with a copious viſcid mucus: the latter is ſecreted by glands, whoſe ducts perforate the membrane, and the largeſt of which are near the termination of the gut.

The extremity of the inteſtine is provided with certain muſcles concerned in the motions performed for the expulſion of the feces: theſe are the levatores ani, ſphincter ani, tranſverſi perinei, and coccygei.

The *levator ani* is a thin, broad, and flat muſcular plane, of an irregularly quadrilateral figure, rather curved in its inner ſurface, and forming a ſeptum, which cloſes the pelvis below, and completes the abdominal cavity. Its origin extends from the pubes to the ſpine of the iſchium: it commences by ſhort aponeurotic fibres, juſt behind the arch of the former bone, and continues its origin from a broad and thin aponeuroſis which covers the obturator internus. The anterior fleſhy fibres paſs obliquely downwards, backwards, and inwards, and are loſt on the proſtate and ſides of the rectum, where they are intermingled with the ſphincter. The larger portion, which is behind theſe, paſſes downwards in the ſame direction, is partly united to the oppoſite muſcle, by an aponeurotic expanſion, between the rectum and coccyx, and partly fixed to the ſide of that bone. The external ſurface of the levator is in contact with the obturator internus, the gluteus magnus, the tranſverſus perinei, and lower down with a large quantity of cellular and adipous tiſſue. The inner ſurface correſponds to the proſtate, bladder, and rectum. For the deſcription of the coccygeus, ſee Coccygæus.

The *ſphincter ani* ſurrounds the termination of the inteſtine juſt under the integuments, and is commonly divided into the ſphincter cutaneus, or externus, and the internus. The latter, as we have already mentioned, is to be regarded rather as the termination of the circular muſcular fibres of the gut, than as a diſtinct muſcle. It is a pretty thick muſcular ring, about half an inch in breadth. Externally, the longitudinal muſcular fibres of the rectum cover it: on the inſide it covers the mucous membrane of the inteſtine. The ſuperior margin is continuous with the circular fibres of the gut: the inferior is placed between the opening of the external ſphincter and the membrane of the inteſtine.

The ſphincter externus, or cutaneus, is placed more ſuperficially than the former, and extends from the apex of the coccyx to the poſterior part of the perineum. It is flattened, elliptical, with its long axis inclined from behind forwards, and perforated in the middle. We diſtinguiſh in it a ſuperior and an inferior ſurface, a right and left edge, and an anterior and poſterior extremity. The thin ſkin ſurrounding the anus covers the under ſurface: the upper correſponds to the levator ani, being at firſt ſeparated from it by cellular tiſſue, but having its fibres completely blended with thoſe of that muſcle on the rectum. The front end forms a ſharp point, extending more or leſs under the back edge of the accelerator urinæ, to which, as well as to the tranſverſi perinei, it is cloſely connected. The poſterior extremity is alſo pointed, and attached to the coccyx by a denſe cellular matter approaching to the nature of ligament. The margins are partly covered by the ſkin, and partly by a maſs of cellular and adipous ſubſtance.

The ſphincter conſiſts wholly of fleſhy fibres, which deſcribe concentric arcs of circles: thoſe of the two ſides are united at acute angles before and behind the anus.

The front end of the muſcle is leſs elongated and acute in the female than in the male ſubject. In both its fibres are intimately blended with thoſe of the internal ſphincter.

The *tranſverſus perinei* is ſituated towards the back part of the perineum, between the tuberoſity and ramus of the iſchium, and the middle of the ſpace compriſed between the bulb of the urethra and the anus. It is thin, flattened, and ſomewhat triangular. The anterior ſurface is inclined downwards, and correſponds to the erector penis and accelerator, and to the fat which fills the intervals between theſe. The poſterior, inclined upwards, lies againſt the levator ani: cellular tiſſue, and the deepſeated branch of the internal pudic artery, ſeparate them. The outer edge is attached to the inner ſurface of the tuberoſity and ramus of the iſchium, above the erector penis and the root of the crus penis. The inner edge is united to that of the oppoſite muſcle, to the front of the ſphincter ani, and to the back edge of the accelerator. The tranſverſus is ſeparated from the ſkin in front by a conſiderable quantity of fat: behind it is confounded with the reddiſh cellular tiſſue found in the angle between the bulb of the urethra, and the root of the corpus cavernoſum. The origin is aponeurotic; and the termination is uſually in a tendinous line.

The *tranſverſus perinei alter* is not conſtantly found. It is a ſlender elongated faſciculus, running parallel to the iſchium, on the inner edge of the erector penis. The origin is derived from the tuberoſity of the bone, near to that of the erector; it terminates above in a thin aponeuroſis connected to the bulb of the urethra, or corpus cavernoſum.

Motions performed by theſe Muſcles.—The muſcular organs juſt deſcribed have two principal offices: 1 They move the whole pelvic viſcera together. 2. They act on the rectum in particular. The levator and coccygeus are principally concerned in the former caſe. They repreſent a muſcular plane capable of elevation and depreſſion, and of moving the organs which it ſupports in various directions. This plane is oppoſed in ſituation and action to that of the diaphragm: thus two ſtrata, concave in oppoſite directions, and capable of contracting or enlarging, at the will of the animal, the perpendicular diameter of the abdomen, are placed at the oppoſite ends of this diameter. The moſt ſignal contraction is obſerved in the violent efforts employed for expelling the feces, urine, &c.: and the moſt marked enlargement in ſtrong exſpirations, as in coughing, ſneezing, &c. But theſe effects are produced much more by the depreſſion of the diaphragm contracting the abdomen from above downwards, than by the elevation of the other muſcles. The latter ſupport the parts, and enable them to reſiſt the efforts of the former: the impulſe may be felt very plainly by placing the hand on the perineum during any ſtrong exertion of the abdominal parietes. The power of reſiſtance is much leſs in theſe parts than in the ſides of the abdomen, becauſe the bony ſides of the pelvis, and the contained viſcera, ſupport great part of the effort.

The action of the ſphincter ani has the effect of contracting the opening of the rectum: it is conſtantly exerted for the purpoſe of maintaining the aperture permanently cloſed. Other openings furniſhed with ſphincters, ſuch as thoſe of the mouth and eyelids, are often open for a conſiderable time, becauſe there are various muſcles which antagoniſe the ſphincters; no ſuch muſcles exiſt about the anus. The only antagoniſt power is in the longitudinal fibres of the rectum, and in the contraction of the abdominal parietes; and theſe are only exerted when the feces are evacuated. An obvious advantage ariſes from the permanent conſtriction of the rectum, in preventing the eſcape of its contents: they are retained in the large inteſtine until their quantity produces irritation. When the ſphincter is paralyſed, they eſcape involuntarily as they arrive in the rectum. This permanent action of the ſphincter reſembles that of parts belonging to the organic life, as it is completely independent of the will: yet we have the power, by means of volition, of conſtringing the opening more completely. The feces are evacuated in oppoſition to the reſiſtance of the ſphincter, which is overcome by an exertion of the abdominal parietes. The harder they are, the greater dilatation is required, and the greater difficulty is conſequently experienced; and *vice verſâ*. When they are very fluid, they may eſcape in a ſlight degree by the longitudinal plaits into which their contraction collects the ſkin of the anus.

The action of the longitudinal fibres of the rectum, and the preſſure of the abdominal viſcera, urged downwards by the reſpiratory muſcles, occaſion the inteſtine to deſcend ſlightly when the feces are voided. The levatores ani, coccygei, and tranſverſi perinei, ſupport the parts under this effort, limit the deſcent, and then reſtore them to their former ſituation. The levatores probably may be concerned in the functions of the generative organs by compreſſing the veſiculæ ſeminales and proſtate; and the tranſverſi, by fixing the poſterior end of the accelerator, may concur with that muſcle in the expulſion of the ſemen.

The large inteſtine of the fœtus is rounder and ſmaller than in the adult, hardly marked by any cells in young embryos, and not exceeding the ſmall in diameter. The cæcum is gradually diminiſhed into the appendix vermiformis, which is conſiderably larger than in the adult, and diſpoſed by its meſentery into a ſpecial arrangement. It is much more conſiderable in ſize compared to the cæcum. This is the appearance of the part at birth, when it uſually contains fecal matter. Soon after, the diſtinction between the cæcum and appendix is more ſtrongly marked: the latter, inſtead of coming from the middle of the former, is produced from its left ſide; and as it is not increaſed while the cæcum is growing in ſize, the proportions of the adult are gradually eſtabliſhed.

After what we have obſerved concerning the action of the ſmall inteſtine, the reader will immediately perceive how the muſcular fibres of the large muſt act.

Intestines, *Inflammation of.* See Enteritis.

Intestines, *Protruſions of.* See Hernia.

Intestines, *Wounds of.* See Wounds.

Intestines *of Birds.* See *Anatomy of* Birds.

Intestines *of Fiſh.* See Fish.

INTIRE Tenancy. See Tenancy.

INTONARE, to touch in the cathedral ſervice a ſingle key on the organ, to pitch for the prieſt, the choir, and the congregation, the reſponſes.

INTONATION, in canto fermo, implies an eccleſiaſtical tone or mode.

INTONAZIONE, *Ital.* intonation, a ſound or tone. A vocal performer who ſings in tune, is ſaid to have a good intonation, the firſt of all vocal virtues. Singing out of tune, falſe intonations, the Italians call *intonationi perfidi.*

INTOUR, in *Geography*, a town of Hindooſtan, in the circar of Cuddapa; 35 miles N.W. of Gandicotta.

INTOXICATION. See Drunkenness.

INTRADA, Intrata, or *Entrata*, *Ital.* an entry, introduction, prelude. In the 17th century, an overture in France was termed *entrée.*

INTRANSITIVE Verbs, in *Grammar*, ſuch whoſe action does not (*tranſire*) paſs on an object, or ſubject. See Verb *Neuter.*

INTRENCHMENT, in the *Art of War*, all ſorts of works made to fortify a poſt againſt an enemy. See Retrenchment.

They uſually conſiſt only of a bank of earth and a ditch, and are of two ſorts; ſuch as the trenches carried on in a ſiege, where the bank is between the ditch and the enemy or town; and where the earth is thrown up againſt the town; and ſuch as ſerve to incloſe a town or camp, ſecure a paſs, cover the entrance into a country or other places, &c. In theſe the ditch is between the bank and the enemy. The firſt ſort are uſually called *trenches* or *approaches;* and the ſecond are generally called *lines.*

It was a maxim amongſt the Romans, that even in their moſt haſty marches they intrenched every night.

INTRESSIN, in *Geography*, a town of the duchy of Warſaw; 40 miles S. of Poſen.

INTRIGUE, or Intreague, an aſſemblage of events, or circumſtances occurring in an affair, and perplexing the perſons concerned in it.

The word is French, *intrigue*, formed from the Latin *intricare;* which, according to Nonius, comes from *tricæ, entanglements;* and that from the Greek τριχες, *hairs: quod pullos gallinaceos involvant et impediant capilli.* Which conjecture is adopted by Tripaud, who will have the word intrigue to be primarily and properly underſtood of chickens, which have the feet entangled in hair; and to be derived from the Greek ἐν, and θριξ, *hair.*

Intrigue is more particularly uſed to ſignify the plot of a play, or romance; or that point wherein the principal characters are the moſt embarraſſed, through the artifice and oppoſition of certain perſons, or the unfortunate falling out of certain accidents and circumſtances.

In a tragedy, comedy, or epic poem, there are always two deſigns; the firſt and principal is that of the hero of the piece; the ſecond contains the deſigns of all thoſe who oppoſe him. Theſe oppoſite cauſes produce oppoſite effects, to wit, the efforts of the hero for the execution of his deſign, and the efforts of thoſe who thwart it. As thoſe cauſes and deſigns are the beginning of the action, ſo thoſe efforts are in the middle, and there form a knot or difficulty, which we call an intrigue, that makes the greateſt part of the poem. It laſts as long as the mind of the reader or hearer is ſuſpended about the event of thoſe oppoſite efforts: the ſolution or cataſtrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up.

The intrigue or plot of the Iliad is two-fold; the firſt comprehends the three days fighting in Achilles's abſence, and conſiſts, on the one ſide, in the reſiſtance of Agamemnon and the Greeks, and on the other, in the inexorable temper of Achilles. The death of Patroclus unravels this intrigue, and makes the beginning of a ſecond. Achilles reſolves to be revenged, but Hector oppoſes his deſign; and this forms the ſecond intrigue, which is the laſt day's battle. See Iliad.

In the Æneid there are alſo two intrigues: the firſt is taken up in the voyage and landing of Æneas in Italy; the ſecond in his eſtabliſhment there. The oppoſition he met with from Juno, in both thoſe undertakings, forms the intrigue. See Æneid.

As to the choice of the intrigue and the manner of unravelling it, it is certain they ought both to ſpring naturally from the ground and ſubject of the poem. Boſſu gives us three manners of forming the intrigue of a poem; the firſt is that already mentioned; the ſecond is taken from the fable, and deſign of the poet; in the third, the intrigue is ſo laid, as that the ſolution follows from it of courſe.

Intrigue, in common language, is uſed to denote a plot; a private tranſaction in which ſeveral parties are engaged, and uſually an affair of love. Johnſon.

INTRINSIC, a term applied to the inner, real, and genuine values, properties, &c. of any thing; in oppoſition to their extrinſic, apparent, or popular values, &c. See Extrinsic.

INTROBIO, in *Geography*, a town of Italy, in the department of the Montagna; 7 miles N. of Lecco.

INTRODUCTION, in *Rhetoric*, is the firſt part of an oration or diſcourſe, deſigned to prepare the minds of the hearers for the ſuitable reception of the ſucceeding parts: and for this purpoſe it is neceſſary that the orator gain the good opinion of his hearers, ſecure their attention, and give them ſome general notion of his ſubject. In order to gain the good opinion of his hearers, the orator, when he introduces the diſcourſe with his own perſon, will be careful to do it with modeſty, and ſeem rather to extenuate his virtues and abilities, than to magnify them: when he ſets out with the perſons of thoſe to whom the diſcourſe is addreſſed, it is not unuſual to commend them for their virtues, and thoſe eſpecially which have a more immediate relation to the preſent ſubject. The other topics which are to be inſiſted upon for gaining eſteem, are principally taken from the ſubject, as its juſtice, importance, advantage, or pleaſure. In ſpeaking of gaining the attention of the hearers, Cicero ſays, we ſhall be heard attentively by one of theſe three things; if we propoſe what is great, neceſſary, or for the intereſt of thoſe to whom the diſcourſe is addreſſed. Some account of the ſubject ſhould always make a part of the introduction. As to the compoſition of this part of a diſcourſe, it ſhould appear eaſy and natural, and connected with the reſt of the diſcourſe: it ſhould be ſuited to its length: the language of it ſhould be juſt, eaſy, and pleaſant: it ought neither to be wholly without paſſions, nor too violent and impetuous. It ought not to be too general. The introduction, however, is not an eſſential part of a diſcourſe, and is ſometimes omitted by the beſt orators. Ward's Or. vol. i. lect. 12.

INTRODUCTOR, in *Antiquity*, was particularly uſed for an officer, who introduced the athletæ to the ſtadium, or place where they were to contend.

INTROITUS, in the *Roman Ritual*, as ſettled by St. Gregory, is an introduction to high maſs on great feſtivals, preceding the uſual pſalms.

INTROMISSION, in *Natural Hiſtory*, is a term relating to the petrifaction of organic ſubſtances, in which mineral ſubſtitution takes place, during the removal of the organic particles, (the mineral being gradually introduced into the animal or vegetable body,) ſupplying the place, and taking the form of the matter loſt. By this mode of petrifaction the internal fabric, as well as the external figure of the original is preſerved. Petrified wood has uſually partaken of this kind of change. See W. Martin's Outlines, p. 55. Petrifactions formed by intromiſſion, are ſometimes ſaid to be ingenerate. Outl. p. 67.

INTRONATI, the name of an academy at Sienna, in Italy.

The members of this academy contented themſelves, at their firſt inſtitution, with eſtabliſhing the following ſix ſhort laws: 1. To pray. 2. To ſtudy. 3. To be merry. 4. To offend nobody. 5. Not to credit too lightly. 6. To let the world-talk.

INTROSUSCEPTION, in *Surgery*. See Intussusception.

INTRUSION, in the *Canon Law*, ſignifies the enjoyment of a benefice, or exerciſe of an office, without a good title to it.

The word is derived from *intrudere*, to *thruſt in*, or *enter by force*.

Intruſion diſqualifies the party from ever holding the benefice.

Intrusion, *Information of*, in *Law*, is a method of ſuit, by information on behalf of the crown, filed in the exchequer by the king's attorney-general, for any treſpaſs committed on the lands of the crown, as by entering thereon without title, holding over after a leaſe is determined, taking the profits, cutting down timber, or the like. See Information.

Intrusion alſo denotes the entry of a ſtranger, after a particular eſtate of freehold is determined, before him in remainder or reverſion. This entry and interpoſition of the ſtranger differ from an abatement in this; that an abatement is always to the prejudice of the heir, or immediate deviſee; an intruſion is always to the prejudice of him in remainder or reverſion. An intruſion is always immediately conſequent upon the determination of a particular eſtate; an abatement is always conſequent upon the deſcent or deviſe of an eſtate in fee-ſimple. And in either caſe the injury is equally great to him whoſe poſſeſſion is defeated by this unlawful occupancy. See Ouster.

INTRUSIONE, a writ brought againſt an intruder, by him that hath fee-ſimple, &c. See *Writ of* Entry.

INTUITION, among *Logicians*, the act whereby the mind perceives the agreement or diſagreement of two ideas, immediately by themſelves, without the intervention of any other: in which caſe the mind perceives the truth, as the eye doth the light, only by being directed toward it. Thus the mind perceives that white is not black, that three are more than two, and equal to one and two. See Idea.

This part of knowledge, ſays Mr. Locke, is irreſiſtible, and, like the ſunſhine, forces itſelf immediately to be perceived, as ſoon as the mind turns its view that way. It is on this intuition that all the certainty and evidence of our other knowledge depends: this certainty every one finds to be ſo great, that he cannot imagine, and therefore cannot require, a greater. See Judgment, Knowledge, Demonstration, &c.

INTUITIVE Evidence, is that which reſults from intuition. Dr. Campbell diſtinguiſhes different ſorts of intuitive evidence: one reſulting purely from intellection, or that faculty which others have called intuition; another kind ariſing from conſciouſneſs; and a third ſort from that new-named faculty *common ſenſe*, which this ingenious writer, as well as ſeveral others, contend to be a diſtinct original ſource of knowledge; whilſt others refer its ſuppoſed office to the intuitive power of the underſtanding. Campbell's Rhetoric, vol. i. book i. chap. 5.

INTURKI, in *Geography*, a town of Lithuania, in the palatinate of Wilna; 18 miles N. of Wilna.

IN-TURN, among *Wreſtlers*, is when one puts his thigh between thoſe of his adverſary, and lifts up his thigh.

INTUSSUPCEPTION, or Introsusception, a term in *Surgery*, expreſſive of a very dangerous diſeaſe, which ariſes from the paſſage of one portion of an inteſtine into another. The word is derived from *intus*, within, and *ſuſcipio*, to receive. The diſorder is alſo frequently named a *volvulus*. It happens moſt commonly in the firſt fifteen years of life, older perſons not being nearly ſo ſubject to the affliction.

When the upper part of an inteſtine paſſed into the lower, that is to ſay, when the introſuſception was downwards (as generally happens), Mr. Hunter called the caſe *progreſſive*; but when the diſeaſe aroſe from the paſſage of a lower portion of bowel into an upper one, he named this example *retrograde*.

Introſuſceptions are probably far more frequent caſes than many ſuppoſe, and numerous infants and young ſubjects, no doubt, are victims to the diſeaſe, without its exiſtence being in the leaſt ſuſpected. The affection may indeed be leſs ſevere; and we are informed, that the greateſt part of three hundred children who died, either of worms, or during dentition, at the Hôpital de la Salpetrieré, and were examined by M. Louis, had two, three, four, and even more volvuli, without any inflammation of the parts, or any circumſtances leading to a ſuſpicion that theſe affections had been injurious during life. M. Louis thought ſuch caſes proved that an introſuſception might be formed, and deſtroyed again, by the mere action of the bowels; an opinion which is confirmed by the obſervation of Dr. Baillie, that "in opening bodies, particularly of infants, an intus-ſuſceptio is not unfrequently found, which had been attended with no miſchief; the parts appear perfectly free from inflammation; and they would probably have been eaſily diſentangled from each other by their natural periſtaltic motion." See Mem. de l'Acad. de Chirurgie, 4to. edit. tom. iv. p. 222, and Baillie's Morbid Anatomy, 2d edit. p. 162.

Mr. Hunter thought that the manner in which an introſuſception may be formed, is, by one portion of a looſe inteſtine being contracted, and the part immediately below relaxed and dilated; under which circumſtances the contracted portion ſlips a little way into that which is dilated. He ſuppoſed alſo, that this change was not the effect of any action in either portion of inteſtine, but might be the conſequence of ſome additional weight in the upper part of the bowel. How far the periſtaltic motion, by puſhing the contents on to the contracted parts, might force theſe into the relaxed ones, Mr. Hunter was unable to determine, though he was inclined to think that nothing of the kind could happen.

Suppoſing the foregoing explanation to be true, an accidental introſuſception may take place either upwards or downwards; but if a continuance or an increaſe of the diſeaſe really ariſes from the action of the inteſtine, it can only be when the caſe is downwards. Yet this does not explain thoſe inſtances in which a conſiderable portion of inteſtine is carried into the gut below. In order to underſtand theſe, the different parts which form the introſuſception muſt be conſidered. We muſt recollect that every introſuſception is compoſed of three folds of inteſtine; *viz.* the *inner*, which paſſes down, and being reflected upwards, forms the *ſecond*, or *inverted* portion, which, being reflected down again, makes the *third*, or *containing* part. This latter is the outermoſt, and is always in its natural poſition.

According to Mr. Hunter, the outward fold is the only one which is active, the inverted portion being perfectly paſſive, and ſqueezed down by the outer, which inverts more of itſelf, ſo that the angle of inverſion, in the caſe, is always at the angle of reflection of the outer into the middle, or inverted fold, while the innermoſt is drawn in. Hence we may ſee how an introſuſception, once begun, may have any length of gut drawn into it.

The external portion acting upon the other folds in the ſame way as upon any extraneous matter, will, by its periſtaltic motion, urge them further; and if any extraneous ſubſtance is detained in the cavity of the inner portion, that part will become a fixed point for the outer, or containing inteſtine to act upon. Thus it will be ſqueezed on, till at laſt the meſentery, preventing more of the innermoſt part from being drawn in, will act as a kind of ſtay; yet, without entirely hindering the inverted outer fold from going ſtill further. For ſince it is the middle fold which is acted upon by the outer, and this action continues after the inner portion becomes fixed, the gut is thrown into folds upon itſelf; ſo that a foot of inteſtine may not form an introſuſception more than three inches long.

The outer portion of inteſtine is alone active in increaſing the diſeaſe when once begun; but if the inner one were capable of equal action in its natural direction, the effect would be the ſame, *viz.* that of endeavouring to invert itſelf, as, indeed, happens in a prolapſus ani. The outer and inner portions would then tend to draw in more of the gut, while the intermediate part only would, by its action, have a contrary tendency.

Although capable of producing a prolapſus ani, the action of the abdominal muſcles cannot aſſiſt, either in forming or continuing this diſeaſe, ſince the effect of it muſt be to make equal compreſſion both above and below.

The manner in which the inteſtines are connected with the meſentery, would lead one to conſider it impoſſible for any portion of the bowels to paſs far within another, particularly as the increaſing quantity of meſentery, that is drawn into the introſuſcepted part, muſt render the further paſſage of inteſtine more and more difficult. The large inteſtines, being alſo more cloſely confined in their natural ſituations, would ſeem to be far leſs liable to the diſeaſe. One of the largeſt introſuſceptions ever known, however, was in the colon, as related by Mr. Whately in the Phil. Tranſ. vol. lxxvi. p. 305. The introſuſception appeared to have begun at the inſertion of the ileum into the colon, and to have carried in the cæcum with its appendix. The ileum paſſed on into the colon, till the whole of the aſcending colon, the tranſverſe arch, and deſcending colon, were carried into the ſigmoid flexure and rectum. The valve of the colon being the leading part, it at laſt got as low as the anus; and when the perſon went to ſtool, he only emptied the ileum, for one-half of the large inteſtines being filled up by the other, the ileum alone, which paſſed through the centre, diſcharged its contents. The diſeaſe, when it thus begins at the termination of the ſmall inteſtines in the large, is particularly apt to proceed to a conſiderable extent, and moſtly proves fatal. Many inſtances of this kind are upon record. In the Edinburgh Medical and Surgical Journal, vol. iii. p. 263, Mr. Langſtaff has publiſhed an intereſting example. The caſe is that of a child three months old, where, upon examination after death, there was an extenſive introſuſception in the uſual direction, together with a ſmaller one of the retrograde deſcription, ſimilar to what occurred in the inſtance related by Mr. Spry in the Med. and Phyſical Journal, No. 11.

Retrograde introſuſceptions are much leſs common than ſuch as are named progreſſive. In the Medical and Chirurgical Tranſactions, vol. i. Mr. Home has inſerted the account of a retrograde introſuſception, which happened in a cabin boy, who had previouſly ſwallowed arſenic. The caſe was alſo rendered remarkable by a ſmall worm, which was found coiled up round the introſuſcepted portion of the inteſtines.

A prolapsus ani is, in ſome reſpects, ſimilar to an introſuſception, and may poſſibly begin in the ſame way; but it is always continued by the action of the abdominal muſcles, and never by that of the bowel itſelf. It differs from an introſuſception in not being included in an inteſtine; for inſtead of having a containing bowel, inverting itſelf by its own action, there is an incloſed inteſtine protruded by the action of the abdominal muſcles, while the paſſage of the feces through it, and the point of inverſion, are at the extremity of the protruſion; and as it becomes inverted, it projects out of the body. Med. and Chir. Tranſ. vol. i. p. 112.

With regard to the ſymptoms of introſuſception, they very much reſemble thoſe attendant on inflammation of the inteſtines, hernia, and any obſtruction in the alimentary canal. In ſeveral of the caſes upon record, the ſeat of the diſeaſe was plainly indicated by a hard tumour upon the left ſide of the abdomen. Sometimes it has been found impoſſible to inject more than a trivial quantity of fluid as a clyſter; a circumſtance which would ſtrengthen the ſuſpicion of what the diſorder really is. If, alſo, (obſerves Mr. Langſtaff,) the invaginated portion deſcended ſo low as to form a protruſion at the anus, and we could aſcertain, that it was not an inverſion of the rectum itſelf, the caſe might be conſidered as clear, and we ſhould have no heſitation in delivering a prognoſis, which, by preparing the friends for the fatal termination, would exonerate us from all blame on its occurrence.

Introſuſception, like moſt other diſeaſes, which are furtheſt from the reach of medical and ſurgical aſſiſtance, has been treated in a great number of different ways.

Former practitioners very commonly exhibited for its relief, a large quantity of crude mercury; a plan which certainly could never have accompliſhed the deſirable object of diſentangling the affected part of the bowels.

It has even been propoſed to perform gaſtrotomy, and M. Hevin, in his "Recherches Hiſtoriques ſur la Gaſtrotomie dans le Cas du Volvulus," has examined, with much ability, the queſtion concerning the prudence and propriety of ſuch a proceeding. After many intereſting obſervations, he expreſſes his decided condemnation of the propoſal. The operation, indeed, is rendered quite unwarrantable by the great uncertainty and obſcurity which almoſt conſtantly prevail in regard to the actual nature of the caſe; but even were the exiſtence of the diſeaſe poſitively known, the project would not be allowable. In the firſt place, cutting into the abdomen, with a view of diſentangling a portion of the bowels, would be of itſelf a ſource of the moſt dangerous and probably fatal conſequences. And in the ſecond place, the ſcheme of diſentangling the bowels would generally be altogether impracticable, by reaſon of the different folds of the inteſtine having become inſeparably agglutinated to each other. This connection, in fact, is ſo ſtrong, that the contained parts can hardly be withdrawn after death. In other inſtances, the ſtricture on the introſuſcepted part cauſes it to inflame and even mortify, in either of which ſtates gaſtrotomy would be quite inadmiſſible.

The forcible injection of clyſters was tried by Dr. Monro, without any beneficial effect.

Others have ſuggeſted the introduction of long bougies and pieces of whalebone within the anus, for the purpoſe of mechanically puſhing back the introſuſcepted portion of the bowels. But after it is known that adheſions are formed in the manner already deſcribed, what ſucceſs can be expected from any plans of this kind? And what inſtrument could be invented, which would follow the windings of the bowels, a conſiderable way, without piercing their coats, and doing the moſt fatal miſchief?

The manner in which the parts are agglutinated, explains why none of the methods hitherto deviſed for the relief of an introſuſception, can be of any material ſervice. Were a caſe to be ſubmitted to ſome kind of treatment, before adheſions had taken place, perhaps the forcible injection of glyſters, and the exhibition of vomits to invert the periſtaltic action of the containing bowel, as propoſed by Mr. Hunter, would be as rational ſteps as any which could be purſued.

We muſt reluctantly acknowledge, however, with Mr. Langſtaff, that, in general, all the modes of treatment, hitherto propoſed, will be found utterly inefficient. "Yet here, as in many other inſtances, the reſources of nature are exhibited in a moſt wonderful and aſtoniſhing manner, while thoſe of art completely fail. The invaginated portion of inteſtine ſometimes ſloughs, and is diſcharged *per anum*, while the agglutination of the parts preſerves the continuity of the inteſtinal canal. The annals of medicine furniſh numerous inſtances, where long pieces of gut have been diſcharged in this manner, and the patient has quite recovered. At the ſame time that we recognize the inefficacy of art, theſe caſes will teach us to repoſe a juſt confidence in the powers of nature, and to retain ſome hope of a favourable event, under the moſt unpromiſing circumſtances." Langſtaff in Edin. Med. and Surgical Journal, vol iii. p. 267, 268.

This gentleman has greatly enriched his paper by numerous references which will be deemed exceedingly valuable by any perſon deſirous of being more particularly acquainted with the preceding ſubject.

INVADIATUS, in our *Old Writers*, a perſon accuſed of any crime, which not being fully proved, he was put *ſub debita fidejuſſione*, and called *invadiatus*.

INVALID, a perſon wounded, maimed, or diſabled for action by age.

At Chelſea and Greenwich are magnificent hoſpitals, or rather colleges, built for the reception and accommodation of invalids, or ſoldiers and ſeamen worn out in the ſervice. See Hospital.

We have alſo ſeveral independent companies of invalids, diſperſed in the ſeveral forts and garriſons.

Of theſe the 41ſt regiment was compoſed in 1719, but it has ſince been put upon the ſame footing with the other regiments of the line. In 1782 there were likewiſe 36 independent companies, forming the garriſons of Jerſey, Guernſey, Scilly, Portſmouth, Plymouth, Cheſter, Hull, and other forts and caſtles; and there were alſo ten independent companies of invalids in Ireland. Invalids have been known in this kingdom ever ſince the reſtoration of Charles II. The invalids are armed like other regiments of infantry; their uniform red, faced with blue, and plain button holes.

At Paris is a college of the ſame kind, called *les invalides*, which is accounted one of the fineſt buildings in that city.

INVASION, in *War*, the entrance or attack of an enemy in the dominions of another ſovereign.

INVECTED, in *Heraldry*, denotes a thing fluted, or furrowed.

Invected is juſt the reverſe of *engrailed*, in which the points are turned outward to the field: whereas in invected they are turned inward to the ordinary.

INVECTIVE, in *Rhetoric*, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the perſon reproved; whereas invective is the work of an enemy, and entirely deſigned to vex and give uneaſineſs to the perſons againſt whom it is directed.

INVENTION denotes the act of finding any thing new; or even the thing thus found.

Thus we ſay, the invention of gunpowder, of printing, &c. The alcove is a modern invention owing to the Moors.

The Doric, Ionic, and Corinthian orders are of Greek invention; the Tuſcan and Compoſite of Latin invention.

Janſon ab Almeloveen has written an Onomaſticon of inventions, wherein are ſhewn, in an alphabetical order, the names of the inventors, and the time, place, &c. where they are made. Pancirollus has a treatiſe of old inventions that are loſt, and new ones that have been made; Polydore Virgil has alſo publiſhed eight books of the inventors of things. (De Inventoribus Rerum.) Beckman has alſo publiſhed a "Hiſtory of Inventions and Diſcoveries."

INVENTION is alſo uſed for the diſcovery of any thing hidden.

The Romiſh church celebrates a feaſt on the fourth of May, under the title of "Invention of the Holy Croſs."

INVENTION is alſo uſed for ſubtilty of mind, or ſomewhat peculiar to a man's genius, which leads him to a diſcovery of things new.

In which ſenſe we ſay a man of invention: Wolfius has made ſome eſſays towards an art of invention.

INVENTION, in the *Arts of Deſign*, is that peculiar quality, which, being of all others the moſt rare, is alſo the moſt eſtimable in an artiſt. Without it the painter or ſculptor riſes not above the ordinary labouring mechanic, nor are his productions ſo uſeful to mankind.

Whether the power of invention be an immediate gift of God, or the offspring of cultivation, has been queſtioned by philoſophers; and while ſome have traced its origin, or fancied they could, to a continued ſeries of acquirements, begun at an early age, and carefully ſtored in the mind, others have regarded it as not attainable by any exertions of man, and no other than a direct impulſe imparted by the omnipotent Creator to his more favoured children.

Whichſoever of theſe abſtruſe opinions be correct, one thing none will be inclined to diſpute, *viz.* that, be the power of imagination, which is the baſis of invention, as vivid as poſſible in the mind of an artiſt, it muſt have materials to work upon; and if the power of combining ideas be originally given, they muſt firſt be collected: that power can never operate if the poſſeſſor does not lay by a ſtore of obſervations upon the nature of things as they paſs before his eyes. Invention is not creation, except as far as relates to the ſenſes and perceptions of man. To him new combinations effectively create new objects; but in fact, it is only the power of combining, in new and previouſly unknown forms, things known individually before. It graſps within its range whatever is poſſible, probable, or already certain; and the artiſt is at liberty to apply and combine whatever appertains to either of theſe qualities in any manner, which, producing novelty, ſtill bears the appearance of truth, and does not wound the common perception of propriety; that is, the propriety which belongs to the nature of the ſubject treated of.

The exerciſe of invention will be more or leſs productive accordingly as the native vigour of fancy or imagination be accompanied by a conſtant and lively obſervation of nature, and a ſtrong remembrance of her various productions under all the different circumſtances in which they are found. A vivid imagination, being thus ſtored with images, requires but the ſlighteſt hint to call forth the moſt brilliant effects, and by contraſt or combination produce new images. Sir Joſhua Reynolds, in his 6th diſcourſe, has obſerved, that "there can be no doubt, but that he who has the moſt materials has the greateſt means of invention; and if he has not the power of uſing them, it muſt proceed from a feebleneſs of intellect, or from the confuſed manner in which they have been laid up in his mind;" and again, "it is vain for painters or poets to endeavour to invent without materials on which the mind may work, and from which inventions muſt originate. Nothing can come of nothing."

In the ſame lecture he remarks, that "the mind or genius has been compared to a ſpark of fire, which is ſmothered by a heap of fuel, and prevented from blazing into a flame. This ſimile, which is made uſe of by the younger Pliny, may be eaſily miſtaken for argument or proof; but there is no danger of the mind's being over-burthened with knowledge, or the genius extinguiſhed, by any addition of images. On the contrary, theſe acquiſitions may as well, perhaps better, be compared, if compariſons ſignified any thing in reaſoning, to the ſupply of living embers, which will contribute to ſtrengthen the ſpark, that, without the aſſociation of more fuel, would have died. The truth is, he whoſe feebleneſs is ſuch as to make other men's thoughts an incumbrance to him, can have no very great ſtrength of mind or genius of his own to be deſtroyed."

Theſe excellent remarks are made by ſir Joſhua when treating of imitation; of the aſſiſtance an artiſt may acquire in his progreſs by ſtudying the productions of other men; and to prove, that no ſource of information, either in nature or art, ſhould be neglected by him who covets the title of a great inventor, or, as it is uſually called, an original genius. He will find it requiſite to be a conſtant obſerver of nature in all her ſteps, whether of the grand, the beautiful, the dreadful, expreſſive and intereſting, or commonplace; the varieties of character among men, their modes of action, the powers of their paſſions, and the various ways in which they exhibit the impulſe derived from them. In ſhort, no object whatever ſhould eſcape his eye without notice; no moral ſentiment or feeling, his mind; and he will thus be beſt qualified to embody and illuſtrate whatever ſubject he may be called upon to repreſent.

This doctrine holds equally true of poetry, and indeed of all purſuits by which men are led, in which their neceſſities or their pleaſures call for the exertion of their talents. But each art or ſcience, having its peculiar end to anſwer, requires the obſervance of peculiar objects. In painting, invention requires the mind of the artiſt to be occupied in calling forth recollections of thoſe circumſtances he may have ſeen in nature, or in works of art, of a character conſonant with that of the ſubject undertaken to be repreſented, and endeavouring to inſpire every part of the compoſition with an uniſon of effect. If, for inſtance, the ſubject be pathetic, the painter will recal to his memory thoſe ſcenes and varied actions and combinations of heads and figures, and that diſtribution and degree of light and ſhade which he may have obſerved in nature to be moſt affecting; and, placing them in ſituations proper for his purpoſe, he will endeavour to carry their effect to the higheſt point of perfection. His principal difficulty will be, as far as relates to the invention, to clear his work of whatever is not neceſſary to diſplay its character effectively; to ſeize upon the moſt juſt and powerfully deſcriptive moment in the occurrence, and, collecting together only what juſtly belongs to it, impart to thoſe materials he ſelects the utmoſt degree of intereſt poſſible within the boundary of his art.

He who tells his ſtory in the moſt natural, and at the ſame time, dignified method; who brings forth images at once intelligent and correct; and, combining them in an agreeable manner, impreſſes the mind of an obſerver with the full ſcope of his intention, without evidently exhibiting the art he has employed, is certainly entitled to the praiſe of the greateſt inventor: not he, who, to be ſtriking and impoſing, compoſes attitudes for paſſions, inſtead of allowing feeling and nature to govern him; and fancies, when he has ſurpriſed by ſtrong contraſt or brilliant colouring, that he has effected the purpoſes of art.

Sometimes, indeed, the painter is called upon, like the poet, to tread in fairy ground, and illuſtrate his ſubject by images of beings found only in the regions of imagination; but he is not at liberty to indulge his fancy ſo freely as the poet. Forms deſcribed do not make ſo ſtrong impreſſions on the ſenſe as thoſe preſented to the eye by lines and colours; and many a high-flown indulgence of the inventive faculty which paſſes current, nay, is even allowable in poetry, would dwindle into pure groteſque if laid upon canvas, or wrought in ſculpture; and would more diſguſt and diſappoint, than gratify a ſenſible mind. Such is Milton's deſcription of Death. The obſcurity of the language in which this deſcription of the all-ſubduing ſon and paramour of Sin is enveloped, alone renders it effective in the poem. In painting, it is idle waſte of time to attempt it.

————" The other ſhape,
If ſhape it might be called that ſhape had none
Diſtinguiſhable in member, joint or limb,
Or ſubſtance might be called, that ſhadow ſeemed,
For each ſeemed either,"

is language ſublimely effective of the intention of the poet, and conveys in its no meaning (when ſtrictly examined) an indiſtinct and vague idea of the nature of the monſter, juſt as the deſcription itſelf is contradictory and indiſtinct. Still the mind of the reader is filled with figure and idea ſufficient for the poet's purpoſe, and the degree of intereſt excited by the appalling tremendous circumſtances of the moment and in ſucceſſion, draws off his attention from dwelling long enough to diſcover the illuſion. But once embody the idea it is made to convey in a picture, where every image remains for examination, and meets the eye, not vaguely, for then it would be no image, but apart and diſtinct, and it becomes abſurd; the ſhadow, ſubſtantial, or ſublimity is overpowered by obſcurity.

The inventor is at liberty to combine all that is poſſible or probable with all that is real; or dwell in poſſibilities or probabilities alone. There is a limit, however, to his exertions, which is, that whatever be the nature of his ſubject, it ſhould have ſuch a degree of uniſon with our ideas of exiſtence, convey ſuch an air of real ſemblance, or be ſo compounded in its parts, as not to ſhock us with an apparent violation of the laws of nature, or the appearance of total impoſſibility. Mr. Opie, in his Diſcourſe on Invention delivered in the Royal Academy, ſays upon the ſame point, "that in the exerciſe of invention in the imitative arts, all poſſible licence may be granted, and any degree of the extraordinary be indulged, which does not incur the cenſure of being extravagant: provided that the trains of ideas be perfectly connected, and the whole conſiſtent with itſelf; that there be nothing ſuffered to intermix which checks the progreſs of the imagination, expoſes the contrivance or illuſions, and recals a different ſet of principles to the mind." To the verge of this limit the artiſt may indulge his fancy, and exert his powers. When he goes beyond it, and launches forth into a world of mere fanciful imagery, he may flatter himſelf that he is working wonders, but in fact he will be regarded as a dealer in legerdemain, as one falſifying his intellectual powers; and will only excite ridicule and mere ſurpriſe, inſtead of that admiration which men of ſound ſenſe can alone enjoy. The true inventor will ſeek only for the moſt natural and direct means of diſcloſing his ideas, of imparting that information he wiſhes to convey, be it of what nature it may. Thus Hogarth ranks with the very firſt among the poſſeſſors of this almoſt god-like quality; notwithſtanding his ſubjects were of a low and frequently vulgar caſt. How admirably ſimple, and yet how completely effective, is his figure of a Woman ſetting fire to the Map of the World in the Bagnio Scene in the Rake's Progreſs! He evidently meant to convey the idea of the miſchievous power of female beauty when the poſſeſſor of it is ſordid, ſelfiſh, treacherous, and baſe! Can words convey it more explicitly? It would be almoſt endleſs, and certainly needleſs, to point out the numerous inſtances with which his works abound of the ſame effective ſimplicity and truth of imagery, which render them ſo admirably attractive and uſeful. Sir Joſhua Reynolds, in his picture of the death of cardinal Beaufort, has been equally ſucceſsful. Shakſpeare informs us that he died in the utmoſt agonies of conſcience without any truſt in God, any hope of ſalvation; the tortures of his mind convulſing him more than the agonies of body. The painter would only repreſent a man writhing with violent pain; and therefore, to give another character and ſentiment to the repreſentation, having effected the appearance of ſuffering, he introduced the fiend, "grinning horribly a ghaſtly ſmile," which at once informs the obſervers of the agency under which the dying man is tortured. Without this figure, which has been ſo loudly reprobated by many who probably regarded beauty rather than ſentiment, the work would have been merely a repreſentation of a ſick man dying in pain, and an aſſemblage of beautiful colours. The fiend decidedly ſtamps its character with his own; and perhaps by a ſimilar figure alone, can we be informed of the nature of the torments the cardinal endured, without reſorting to the original Gothic mode, of introducing a label from the mouth or over the head of the figure.

In every branch of the art invention is demanded, and without it, tameneſs and inſipidity will be the reſult of the artiſt's labours. In drawing, in colouring, and in chiaroſcuro, ſelection, or that ideal beauty of form, force and effect on which all lovers of the arts alone delight to dwell, is entirely an effort of invention. To it we owe the beautiful and ſublime forms of the ſtatues of the heathen gods, and the grand ſtyle of deſign of which Michael Angelo and Lionardo da Vinci are the parents: the rich, deep, and harmonious ſtyle of colouring of Titian, Giorgione, and Rubens; the magic ſweetneſs of effect, or chiaro-ſcuro, in Correggio, and the force and brilliancy of it in Rembrandt. To Raphael, however, it is that the art is indebted for the nobleſt uſe of invention. His object always appears to have been the illuſtration of his ſubject, not the exhibition of his art. Of this none ever appear to have been ſo capable, none ſaw ſo fully the whole force of it, entered ſo immediately into the very heart, and throwing all trifling or indifferent occurrences aſide, applied his force to ſtrengthen what was ſo uſeful, or feeling what was wanting, was fertile in expedients to ſupply its deficiency. We have mentioned one inſtance under the article ENERGY, in *Painting*, which exhibits ſtrongly the native vigour of the mind of Raphael, *viz.* the Cartoon of Ananias ſtruck dead: wherein we have ſhewn his invention not only to have been capable of delineating the fact, but alſo of informing us in ſome meaſure of the preceding and ſubſequent circumſtances connected with it. The ſame power may be pointed out in others of his works, particularly in the cartoon of the ſacrifice to St. Paul and Barnabas at Lyſtra. The great perfection of the inventive faculty in the mind of this extraordinary man is exhibited in the purity, ſimplicity, and truth of the images he ſelects. It is very ſeldom indeed that his ideas require explanation, he never appears to have wandered from the ſubject of his work in ſearch of ſomething abſtruſe or rare, but truſts to the growth of ideas which appear naturally to have ſprung up in his mind upon conſideration of the nature and object of it. Yet ſo well ſtored was he with nature and art, that he is rarely inſipid or deficient of illuſtration, either as relates to beauty, elegance, and grace of compoſition, or expreſſion and ſentiment.

Invention in the works of Michael Angelo Buonarotti is exhibited in a very different mode. Inſtead of treading in the beaten path of common life, or adopting the labours of others, he, breathing the ſpirit of the epic poet, invents his ſubject; and clothes it with the ideal grandeur which breadth of form, flowing lines, and bold and difficult actions can give it. Taking his own conception of the generic character of the human body for his model, he perfected, if not invented, a ſtyle of deſign entirely new, of a ſublime and dignified nature, though bordering upon the extravagant, and rendered truly ſo by moſt of his imitators. Of this ſtyle Lionardo da Vinci is perhaps properly the parent, but he had not the full force of M. Angelo, and his invention in art was engaged in a middle way between thoſe of the two great men we have mentioned.

In Titian we find the ſame faculty operating in a manner totally different. To him it was moſt grateful to ſeek after and develope the power of colours in brilliancy, depth, and clearneſs: and maintaining their full powers, to unite them by arrangement or contraſt, in a manner harmonious and agreeable to the eye. Add to this application of his invention, a very extraordinary degree of perception of grandeur and dignity in deſign and effect, and he will be found to have extended the boundaries of art in no inferior degree.

To this talent in Correggio and Parmegiano we are indebted for whatever is grateful, ſoft, and amiable in the art of painting; and to Rembrandt for bold vivid effects of the chiaroſcuro: whilſt Rubens, endowed by providence with almoſt ſuper-human powers, revelled in the utmoſt luxury of imagination, and produced works repreſentative of almoſt all the varied objects of creation, with a gaiety of action and a ſplendour of colouring and effect unknown, in ſo extenſive a combination, to any artiſt before or after him.

It is only by a conſtant ſtudy of the works of nature and of art that a mind poſſeſſed with the power of invention can ever be enabled to exert itſelf either extenſively or uſefully. The impreſſions made upon it by the common intercourſe of life, without a preciſe direction of ſtudy, would be ſoon exhauſted; and one poorly gifted by nature with the fire of imagination, but anxiouſly and ſteadily purſuing the ſtudies recommended, would ſoon ſurpaſs the former, be he never ſo richly endowed if he neglected the neceſſary cultivation.

INVENTION, in *Muſic.* Having no objects, melody, or harmony in nature to copy, except the common chord ariſing from the diviſions of a ſtring or ſounding body into its harmonics, a muſician has more to invent than the profeſſor of any other art. Every paſſage, every combination, every motivo or ſubject, that has not been uſed before, is invention. There is ſo little invention in ſome compoſitions, that whoever has heard or ſeen much muſic, could point out the prototype of every bar. There is, on the contrary, ſuch an ambition in ſome authors of being new, that the ear is teazed and diſappointed by the conſtant ſtruggle and labour to be unnatural. Haydn's invention, which is ſo unbounded, is never puſhed to ſuch exceſs. There is in his moſt original and capricious movements and paſſages, a mixture of natural, graceful, ingenious or ſpirited connecting traits, which relieve the hand of the player, and the attention of the hearer.

There is no infallible receipt for invention; all a maſter can do is to recommend to his diſciples to avoid exceſſes of every kind: too eaſy and common, too hard and uncommon; complaints of pieces being too long are more frequently made than of their being too ſhort, which would be more flattering to a compoſer. When fertility is wanting, paſſages are frequently repeated alla tanta Roſalia, to a degree which now cannot eſcape remark and cenſure. A maſter cannot, nor ought if he could, tell his pupil in compoſition what to adopt; he can only tell him what to avoid. See COMPOSITION, and COUNTERPOINT, to which this article may ſerve as a ſupplement.

INVENTION, in *Poetry*, is applied to whatever the poet adds to the hiſtory of the ſubject he has choſen; as well as to the new turn he gives it.

INVENTION, in *Rhetoric*, ſignifies the finding out, and chooſing of certain arguments which the orator is to uſe for the proving or illuſtrating his point, moving the paſſions, or conciliating the minds of his hearers.

Invention, according to Cicero, is the principal part of oratory: he wrote four books De Inventione, of which we have but two remaining.

This invention of the orators cannot, according to lord Bacon, be properly called invention: to invent, is to diſcover things not yet known, not to recollect thoſe that are; whereas the uſe and office of this rhetorical invention are only, out of the ſtock of knowledge laid up in the mind, to ſelect ſuch articles as make for the purpoſe.

The ſame author divides this faculty of invention into two parts, the one *topical*, the other *promptuary*: the firſt points out the way in which we are to purſue the argument; the latter only lays up and diſpoſes things, for which we have frequent occaſion, in the mind.

Invention furniſhes the orator with thoſe different kinds of arguments and motives which are adapted to the various purpoſes he has in view. The helps of invention are a lively imagination and readineſs of thought, great learning and extenſive knowledge, previous conſideration, and clear enlarged apprehenſions of the ſubject. See ARGUMENTS, COMMON PLACES, and TOPICS, &c.

INVENTORY, in *Law*, a catalogue, or ſchedule orderly made of all a deceaſed perſon's goods and chattels, at the time of his death, with their value appraiſed by indifferent perſons, which every executor or adminiſtrator is obliged to exhibit to the ordinary upon oath, if thereunto lawfully required.

By 21 Hen. VIII. c. 5. executors and adminiſtrators are to deliver in upon oath to the ordinary, intended inventories, one part of which is to remain with the ordinary, and the other part with the executor or adminiſtrator: this is required for the benefit of the creditors and legatees, that the executor or adminiſtrator may not conceal any part of the perſonal eſtate from them. The ſtatute ordains that the inventory ſhall be exhibited within three months after the perſon's deceaſe; yet it may be done afterwards, for the ordinary may diſpenſe with the time, and even with its being ever exhibited, as in caſes where the creditors are paid, and the will is executed.

The uſe of the inventory is borrowed from the civil law: for whereas by the law of the ancient Romans the heir was obliged to anſwer all the teſtator's debts; by which means, inheritance ſometimes became rather prejudicial than profitable; to obviate this inconvenience, Juſtinian ordained, that if the heir would firſt exhibit a true inventory of all the teſtator's effects, he ſhould be no farther charged than to the value of the inventory.

In the Britiſh army, when any commiſſioned officer happens to die, or is killed on ſervice, it is directed by the articles of war, that the major of the regiment, or the officer doing the major's duty in his abſence, ſhall immediately ſecure all his effects or equipage then in camp or quarters; and ſhall before the next regimental court-martial make an inventory thereof, and forthwith tranſmit the ſame to the office of our ſecretary at war, to the end, that the executors of ſuch officer may, after payment of his regimental debts and quarters, and the expences attending his interment, receive the overplus, if any be, to his or their uſe.

When any non-commiſſioned officer, or private ſoldier, happens to die, or is killed on ſervice, the then commanding officer of the troop or company, ſhall, in the preſence of two other commiſſioned officers, take an account of whatever effects he dies poſſeſſed of, above his regimental cloathing, arms and accoutrements, and tranſmit the ſame to the office of the ſecretary at war. Theſe effects are to be accounted for and paid to the repreſentative of ſuch deceaſed non-commiſſioned officer or ſoldier; and in caſe any of the officers, ſo authorized to take care of the effects of dead officers and ſoldiers, ſhould, before they have accounted to their repreſentatives for the ſame, have occaſion to leave the regiment by preferment or otherwiſe, they are ordered, before they be permitted to quit the ſame, to depoſit in the hands of the commanding officer, or of the agent of the regiment, all the effects of ſuch deceaſed non-commiſſioned officers and ſoldiers, in order that the ſame may be ſecured for, and paid to, their reſpective repreſentatives. See Articles of War, ſection XIX.

INVENTORY, in *Trade*, is a liſt, or particular valuation of goods, &c. See VALUE, APPRAISEMENT, &c.

INVER, in *Geography*, a ſmall river of the county of Donegal, Ireland, which is diſcharged into a ſmall bay, to which it gives name. Inver bay may be conſidered as a part of Donegal bay, and has good anchorage. The pariſh is alſo called Inver, and there was formerly an abbey there. There is alſo a village called Inver in the county of Mayo, on the eaſt ſide of Broadhaven, and in the wild barony of Erris.

INVERARY, a royal borough, and the county town of Argyleſhire, Scotland, is ſituated on the ſouthern bank of Loch Fyne, where the river Aray, or Aooridh, falls into the ſea. It conſiſts chiefly of one row of commodious houſes, built with great uniformity, and covered with ſlate. The old town was ſituated on the north ſide of the bay. It ſeems probable, that, prior to the fourteenth century, Inverary was little more than a ſmall village for fiſhermen, who ſubſiſted by their occupation, and erected their huts here. About that period, the family of Argyle fixed on this ſcite as their place of reſidence; and as the hereditary juriſdictions of juſticiary and ſheriff were veſted in them, Inverary became the ſeat of the courts and the county town. The circuit court of juſticiary is held here twice a year for the trial of offences in the counties of Argyle and Bute, and the minor courts are thoſe of the ſheriff, magiſtrates, and juſtices of the peace. It was created a royal borough by charter from king Charles I., and is governed by a provoſt, two bailiffs, and a council, nominated by the duke of Argyle. Its only revenue, about 30*l.* ſterling annually, ariſes from the petty cuſtoms and the rent of a common, which, on the erection of the borough, was beſtowed on it by the Argyle family. About the middle of the laſt century, Archibald, duke of Argyle, ſeeing how inadequate this revenue was to the occaſions of the borough, added to it a perpetual annuity of 20*l.* ſecured on his eſtate.

Inverary is ſo ſituated in the Highlands, that as many of the inhabitants ſpeak Engliſh as Gaelic, and two miniſters officiate in theſe dialects. For which purpoſe, two new churches, under one roof, have been recently built, from a deſign by Mr. Milne. Inverary ſeems tolerably well ſituated for manufactures, yet none are carried on to any great extent. About the year 1748, duke Archibald introduced the linen manufacture, which has been attended with beneficial conſequences. The late duke eſtabliſhed a woollen manufacture; and erected proper buildings and machinery, which he gave to the town; but the buſineſs has not been conducted with any adequate advantage.

Inverary derives its chief ſource of profit from the herring fiſhery in Loch Fyne. This lake, which extends more than 30 miles from the Weſtern ocean into the country, has been, from time immemorial, noted for its herrings, which are ſaid to be ſuperior in quality to any found in the Weſtern ſeas. The fiſhery generally commences in July, and ſometimes continues till the end of the year. During this ſeaſon, the lake is frequented by innumerable ſhoals. The country people expreſs the quantities of herrings abounding here, in very ſtrong language: "At theſe ſeaſons," ſay they, "the lake contains one part of water and two parts of fiſh." In this ſingle bay five or ſix hundred boats are ſometimes employed in the fiſhery; and it is eſtimated, that in ſome ſeaſons, upwards of 20,000 barrels of herrings have been caught and cured; each barrel containing, at a medium, ſeven hundred fiſh. Part of each boat is covered with a kind of ſail-cloth, to ſhelter the four men who compoſe the crew, and who ſeldom quit their boat during the whole ſeaſon. The inhabitants of Inverary, and of the banks of the loch, do indeed ſpend Sunday at home; but as many of the boats come from more diſtant parts, the crews take up their abode entirely in them, ſubſiſting chiefly on herrings. The night is the time of fiſhing; the day is employed in gutting the fiſh, in ſleep, or in ſinging Celtic ſongs to the ſound of the bagpipe. Each boat clears, on an average, from 40 to 50*l.*, and, in very productive ſeaſons, 100*l.* The pariſh of Inverary extends about 18 miles in length, and about three in breadth, on an average. The number of houſes in the late return to parliament was 275, of inhabitants 2045.

At a ſmall diſtance from the town, is the houſe, or caſtle, of Inverary, the principal ſeat of the duke of Argyle, and the chief ornament of the Weſtern Highlands. It is ſituated on a gentle riſe, on the weſtern ſide of Loch Fyne; and is ſurrounded by an amphitheatre of mountains, ſome of which are rugged and broken, and others entirely covered with wood. The loch from this place appears like a large bay, round which are ranged plantations, covering the ground to a vaſt extent, from the lake to the ſummit of the higheſt mountains. The caſtle, rearing its towers above the woods, has a very picturefque effect; to the ſouth-eaſt of which, cloſe to the bay, appears the town of Inverary in its uniform line of handſome buildings. On the right is a fine view of Dunicoich, a ſteep hill, 700 feet in height, covered with wood almoſt to the ſummit. Inverary Houſe, though by no means an old ſtructure, is built in the form of a caſtle, upon the plan of the manſions of ſome of the German nobility. The hall, which is very ſpacious, is hung round with arms and other ornaments adapted to the ſtyle of a Highland caſtle. In the election of a repreſentative to parliament, Inverary is claſſed with Ayr, Irvine, Rothſay, and Campbeltown. Sinclair's Statiſtical Account of Scotland, vol. v.

INVERKEITHING, a royal borough and ſea-port town in Fifeſhire, Scotland, is ſituated on an eminence at the head of the bay which bears its name on the north coaſt of the Frith of Forth. It conſiſts of one principal ſtreet of conſiderable length, with a ſmaller one branching from the middle of the former, and a few lanes. The houſes have an ancient appearance, and almoſt every one has a piece of garden ground annexed to it. The return to parliament in the year 1801, ſtated the number of houſes to be 350; of inhabitants 2228. The borough received its firſt charter from king William, ſurnamed the Lion; ſince whoſe time ſeveral kings of Scotland have granted other charters, all which were ratified and confirmed by king James VI. in a writ bearing date May 4th 1598. The civil government is veſted in a provoſt, two bailiffs, a dean of guild, and a treaſurer, all of whom are annually elected by the counſellors and deacons of trades. The latter, five in number, are alſo elected yearly: but the counſellors hold their office during life and reſidence; theſe muſt not be fewer than twenty, but are not limited to any number. The town-houſe, a neat ſtructure, built in 1770, contains a priſon, and rooms for the town-clerk, and for public meetings and entertainments. The bay of Inverkeithing is large and ſafe, and affords anchorage to veſſels of any burthen in all winds. Here ſhips of war from the Leith roads ſeek ſhelter from the winter ſtorms, and merchant ſhips from the Mediterranean uſed to perform quarantine. The harbour itſelf is a ſmall bay; at the mouth of which, on the weſt ſide, lies a large Dutch built veſſel as a lazaretto; where, inſtead of detaining ſhips from foreign parts, the particular goods ſuppoſed to be infected are immediately received, aired under the inſpection of a proper officer, and delivered within a limited time to the owners. At the head of the bay is the quay, the place for landing and receiving goods; the depth of water at ſpring-tides is thirteen and ſometimes fifteen feet. The chief employment of the veſſels ariſes from the exportation of coal and ſalt. The coal is brought to the ſhore by a waggon road three miles in length; and 25,000 tons are annually ſhipped on an average: the demand is greater than can be anſwered; and veſſels, to the number of forty or fifty, are ſometimes obliged to wait ſeveral weeks for their cargo. The quantity of ſalt annually made is from twelve to fifteen thouſand buſhels. Inverkeithing was a royal reſidence in the time of king David I.; veſtiges of his houſe were viſible within the laſt fifty years. This borough joins with thoſe of Culroſs, Queensferry, Stirling, and Dumferline, in ſending a member to parliament.

On the top of Lethen-hill, near the town, are ſeveral upright ſtones, placed in a circular form, ſaid to have been a druidical temple: and in the northern part of the pariſh is a ſtone ten feet high, called the Standing ſtone, on which are baſſo relieves of ſeveral rude figures of men and horſes. Within the pariſh is alſo the caſtle of Roſyth, a ruinous edifice, built upon a rock, and at high water entirely ſurrounded by the ſea; it was one of the ſeats of the Stuart family, and is now the property of the earl of Hopetoun. The celebrated admiral Greig, commander in chief of the Ruſſian navy, was a native of this pariſh. Sinclair's Statiſtical Account of Scotland, vol. x.

INVERNESS, a royal borough, and the county town of Invernеſsſhire, Scotland, is ſituated on the ſhore of Moray-Frith, and is divided into two unequal parts by the river Neſs, over which is a ſtone bridge of ſeven arches. It is a borough of great antiquity; and according to the beſt authority obtained its firſt charter from king Malcolm Canmore. In ancient times the townſmen maintained many deſperate conflicts with the neighbouring rebellious chieftains and their clans. Traces of this ſtate of hoſtility are ſtill extant, on the weſt ſide, where irruptions were commonly made. At a ſmall diſtance from the town, is a place called *Pallfaire*, that is, "the Watch-Town;" alſo a hill, named *Tomnafaire*, "the Watch-Hill;" and a large ſtone, called *Clachnafaire*, "the Watch-Stone." The laſt charter in favour of the borough was granted by king James VI. From that period to the revolution, the inhabitants were an induſtrious and thriving people; carried on a conſiderable commerce in corn and ſkins; and brought the malting trade to great extent; a conſiderable part of the town conſiſting of kilns and granaries. From the revolution to the year 1746, the borough ſuffered a gradual decline; ſo that, at that period, and for ſeveral years after, the town appeared little better than the ruins of its former ſtate. In the rebellion in 1745, which commenced among the chiefs in the weſtern part of this county, Inverneſs became the centre of all the military operations, and other works carried on by government. Hence it began to revive, and commerce was gradually reſtored. The principal manufactures now are thoſe of hemp and flax. The firſt has been eſtabliſhed about forty years; and at preſent employs above a thouſand perſons in ſpinning, dreſſing, and weaving. The raw material is imported from the Baltic, and manufactured into ſail-cloth and ſacking; which are ſent to various parts of Britain, and the Eaſt and Weſt Indies. A white thread manufactory has been eſtabliſhed nearly twenty years; and employs in its various branches of heckling, ſpinning, twiſting, bleaching, and dyeing, not leſs than ten thouſand individuals in the town and ſurrounding country. The company have, in this and the neighbouring countries, ſeveral agents for the management of the ſpinning departments. The flax is alſo chiefly imported from the Baltic, and the greateſt part of the thread ſent to London, whence it is diſperſed to different parts of the world. The cotton manufacture has been introduced here with ſucceſs. Inverneſs poſſeſſes peculiar advantages for manufactures; the raw material being eaſily imported, and the manufactured goods readily exported. Dearneſs of fuel is the greateſt obſtacle, coal being imported from England. The ſituation of the town is highly favourable. Ships of four or five hundred tons can ride at anchor within a mile of it; and at ſpring tides veſſels of half that burthen can come up to the quay cloſe to the town. The principal part of the veſſels belonging to Inverneſs, is employed in conveying to London the produce of the manufacture, alſo the fiſh caught in the river Neſs, and the ſkins of otters, rabbits, hares, foxes, goats, roes, &c. In return, materials are brought back both for uſe and luxury; particularly hardware and haberdaſhery; with which the traders of this town ſupply the extenſive ſurrounding diſtrict. A ſpacious harbour or baſin has been conſtructed here for veſſels ſailing acroſs the iſland by the Caledonian canal.

Inverneſs is a large and well-built town; many of the houſes are lofty, and aſſume an elegant appearance. It may be conſidered as the capital of the Highlands; being the only town of any importance north of Aberdeen. It was returned, under the act of 1801, as containing 1431 houſes, and 8732 inhabitants. Nearly in the centre of the town ſtands the Court-houſe, connected with the Tolbooth, a handſome modern building, with a tower terminated by a ſpire. An academy, on a very liberal and extenſive plan, was eſtabliſhed here in the year 1790, and is ſupported by voluntary ſubſcription. A piece of ground, containing about three acres, was purchaſed, and an appropriate building erected, conſiſting of a large public hall and ſix ſpacious apartments, for the accommodation of the different claſſes, for a library, and for philoſophical apparatus. The ſeminary is conducted by a rector and four tutors; the number of ſtudents is generally between two and three hundred; who are divided into five claſſes. In the firſt, the Engliſh language is taught; in the ſecond, Latin and Greek; in the third, arithmetic and book-keeping; in the fourth, geometry, trigonometry, menſuration of planes and ſolids; geography, navigation, and practical aſtronomy; naval, civil, and military architecture; gunnery, perſpective and drawing; in the fifth, or higheſt, under the immediate care of the rector, are taught civil and natural hiſtory, experimental philoſophy, and chemiſtry. The rector has a ſmall houſe and a ſmall ſalary; the tutors have ſtill leſs ſalaries; ſo that their chief dependence is on the fees of their ſeveral claſſes, which is an incitement to attention and induſtry.

The civil government of the town is veſted in a provoſt, four bailiffs, and a dean of guild, aſſiſted by a council of twenty-one members, called the town council. The members of the new council are elected every year by the old previous to their ſeceſſion from office: and the former elect from among themſelves the provoſt, bailiffs, dean of guild, and a treaſurer. There are ſix corporations of craftſmen, beſides ſeveral crafts not incorporated. The edifices for public worſhip are, three national or Preſbyterian churches, and one of Epiſcopalians, with chapels for diſſenting congregations.

About half a mile from the town, on the weſtern ſide, is Tmona-heurich, the "Hill of Fairies," a beautiful inſulated hill covered with trees. It is of a ſingular form, nearly reſembling a ſhip with the keel uppermoſt: its baſe is a parallelogram, in length 1984 feet, in breadth 176; from which it riſes above 250 feet above the level of the river. About a mile farther from the town is another hill, called Craig Phatric, rugged and ſteep, and much higher than the former; the elevation of its higheſt part being 1150 feet above the bed of the river: the ſummit is flat, and has been ſurrounded by a wall eighty yards long by thirty broad. The moſt remarkable circumſtance attending it is, that the ſtones are all firmly cemented together by a vitrified matter like lava, or reſembling the flag or ſcoriæ of an iron foundery; and even the ſtones, in many places, ſeem to have been ſoftened and vitrified. The circuit court of juſticiary for the northern diſtrict, comprehending the counties of Inverneſs, Roſs, Caithneſs, Orkney, and Sutherland, is held at this place. Sinclair's Statiſtical Account of Scotland, vol. ix.

INVERNESS, *New*, a town of America, in the ſtate of Georgia, ſituated on the river Alatamaha, and built by a company of emigrants from the Highlands of Scotland, 130 of whom were taken oven by Gen. Oglethorpe in 1734. It is about 20 miles from Frederica.

INVERNESS *and Fort William Canal*, was the parliamentary name firſt given, in the act of 1793, to an important line of canal for the paſſage of large ſhips acroſs Scotland, principally in Inverneſsſhire, of the deſigns for which we gave a full account, under that head, in our article CANAL, and have ſince added, under the topographical articles CLACHNACHARRY and CORPACH, villages at the extremities of the line, ſuch particulars as had occurred to the time of putting theſe articles to the preſs, reſpecting the progreſs of the works: in the preſent article we ſhall have the pleaſure of ſtating the further and ſucceſsful progreſs, to the preſent time, of this very large and important undertaking, now more commonly known by the name of the Caledonian Canal. Seven annual reports have now been made by the commiſſioners appointed to manage this great national work, and printed by order of the houſe of commons; which reports contain the greateſt body of minute information, ſatisfactorily arranged, by John Rickman, eſq. the ſecretary to the commiſſioners, which has, perhaps, ever been given to the public, and ſhew ſtrongly the merit which is due to Meſſrs. William Jeſſop and Thomas Telford the engineers, for the correctneſs of their original deſigns and eſtimates, and to the latter gentleman in particular, for carrying the whole into effect by himſelf and his reſident aſſiſtants. From the laſt of theſe reports (ordered to be printed the 31ſt of May 1810), it appears, that about ſix miles in length at the Clachnacharry, north-eaſtern, or Inverneſs end of the line, were in hand or finiſhed; and about the ſame length, at the Corpach, weſtern or Fort-William end, were alſo in progreſs, except ſome particular parts, preſenting no material difficulties. We ſhall firſt mention thoſe important and expenſive works, the entrance ſea-locks in Loch Beauley, and in Loch Eil.

At Clachnacharry two ſea-mounds, or parallel banks for incloſing the canal, have been extended more than 360 yards into the ſea beyond high water-mark, and have been ſecured by a wall of puddled earth carried up from the bottom: and as the ſhore here is found to conſiſt of wet muddy ſands, capable of conſiderable compreſſion by the weight of theſe artificial banks, the ſame have been extended higher than would otherwiſe have been neceſſary, and at the further extremity they have been joined into a ſolid maſs, by filling up the ſpace in which the ſea-lock is to be conſtructed, and allowing time for this great weight of earth to act, in compreſſing the ſoft bottom, before the digging therein for the lock is commenced; by which the great expence and riſk of a coffer-dam is to be avoided. The ſea-mounds of earth, three hundred and fifty yards beyond high-water mark, and the coffer-dam for the ſea-lock at Corpach, had been ſome months made and erected and ſtood firm, and at the time of making the 7th report the ſteam-engine and drains thereto from the ſcite of the lock were completed ready for commencing the excavation. The ſecond lock at the ſouth-eaſt end of Clachnacharry village had been completed, except the gates, ever ſince 1806; the maſonry of the four connected locks (Nos. 3, 4, 5, 6,) at Muirtown, N. of Inverneſs, were alſo completed, and their joints pointed with Parker's cement, prepared from the Ludus helmontia, or clay-balls of the London clay ſtrata. The two locks at the N.W. end of Corpach village were long finiſhed, all but their gates, and the maſonry of the ſix loweſt of the principal chain of eight locks near Corpach-moſs were about completed. In the next moſt important head, that of aqueduct bridges, road arches, and culverts under the canal, one, only a ſmall culvert, had been found neceſſary in the Clachnacharry diſtrict, and was finiſhed in the lands of Kinmylies: in the Corpach diſtrict, five conſiderable aqueducts had been completed a long time, *viz.* at Lower Banavie, Upper Banavie, Shangan, Muirſhearlich, and Loy, all of which had their arches enlarged and paved at the bottom, or ſide arches conſtructed, in order to ſerve as road arches under the canal, and ſuperſede the expence and great inconvenience of as many communication ſwing bridges over the canal: for which they have been found very complete ſubſtitutes. A large job of maſon's work had alſo been completed in walling the intended wharfs, 113 yards in length, at the ſouth-eaſt end of the large baſin intended for holding the ſhips which trade to Inverneſs, ſuch wharfs being ſituate within leſs than a mile of the town. In the Clachnacharry diſtrict the maſonry of the road bridge at Muirtown had been completed, and a temporary timber bridge laid upon it; the maſonry of Bught bridge was very nearly completed, and a temporary wooden bridge had been laid over the middle of the eight Corpach-moſs locks, for the road to Lochie-ferry and Fort-William, where the maſonry for a ſwing bridge had been prepared.

Of the earth works, the ſtupendous embankments for the ſea-locks at the extremities of the canal have been mentioned: in Kinmylies lands, W. of Inverneſs, a conſiderable embankment, acroſs ſome low ground, had been very nearly completed: a more conſiderable and difficult embankment along the whole courſe of the Neſs river, extends near half a mile in length, under the ſteep bank of Torvaine; a new channel for the river being formed ſouth of this, and the new canal bank effectually faced with looſe rubble ſtone to protect it from the floods: at Molindour a ſimilar embankment along the bed of the old Neſs, and the making of a new channel for it for a quarter of a mile in length, has been completed, under Torremore, a ſteep bank. In the lands of Doughgarroch, near the Smithy, another embankment for the canal acroſs a loop of the river, and enlarging its channel on the further ſide of a gravel iſland were in hand. In the Corpach diſtrict, embankments of earth have been completed over each of the five aqueduct bridges mentioned above, and many ſmaller ones, particularly in the rugged tract between Upper Banavie and Shangan aqueducts. The principal extra cutting, or removing of earth, has been on the S.E. of Clachnacharry, where a baſon of 20 acres extent, being more than one-third of a mile long, has been completed; the principal deep-cutting, partly executed in this diſtrict, being nine feet deep, for about half a mile in length, through the lands of Doughgarroch. The principal work of extra cutting in the Corpach diviſion, has been the baſin next the ſea-lock, great part of which is hard rock-cutting, and was partly completed, waiting for the ſteam-engine to drain it: conſiderable deep cuttings occur on each ſide of the rivulet of Moy, and near ſeveral others of the aqueducts for ſtraightening the courſe of the canal, and finding ſtuff for adjacent embankments, all of which were completed. Having thus enumerated all the principal works which had been entered on or completed, we ſhall preſent an account of the total expenditure from the commencement on the 20th of October 1803, to the third of May 1810, *viz.*

	£.	s.	d.
Purchaſe of lands and buildings, and payments on account of damage for the canal-works, roads, quarries, &c.	16,442	8	6
Labour and workmanſhip paid by meaſurement, or per job, in excavating, puddling, banking, forming temporary rail-roads, ſawing, and carpenters' work	125,186	16	10¾
Carry over	141,629	5	4¾

	£.	s.	d.	£.	s.	d.
Brought over				141,629	5	4¾
Labour and workmanſhip paid by the day or tide, ſetting out and trying the ground, whiſkey for the men working in the water, &c. - - -				5,711	10	11½
Quarries and maſonry work, and for bricks, lime, and cement - - -				70,971	14	1¼
Timber, *viz.* foreign fir and carriage - -	9,310	12	7¾			
Native timber, purchaſed in the neighbourhood, felling, carriage, &c.	11,795	15	5½			
				21,106	8	1¼
Machinery, including four ſteam-engines, a ſaw-mill, dredging-machine, iron rails for all the temporary rail-ways, various tools and utenſils, and repairing of the ſame, carriage, &c. - - -				29,869	15	5¾
Shipping; building and rigging four ſloops and barges, repairs, ſtores, ſeamens' wages, ſhore dues, &c. in fetching part of the ſtone from the diſtant quarries to the works - - -				5,573	18	10¾
Purchaſe and hire of horſes and provender, farriery, &c. for extra and irregular works, the ſuperintendant's nag, &c.				811	18	0
Houſes, compting-houſes, ſheds, ſtables, and other temporary buildings for the uſe of the ſuperintendants, and the work - - - - -				2,345	3	9
Stationery, portage, carriage of parcels, ſeeds for the canal banks, &c. -				434	11	6½
Expences of management, *viz.* expences of ſurveys and obtaining the act, ſurveys and valuations of land, juries, and conveyancing: the ſecretary's, engineer's, and ſuperintendant's ſalaries, keeping and copying accounts, reports, &c., reducing and engraving maps, &c. and travelling expences - -				10,998	12	2½
Total -				£.289,452	18	5¼

The Britiſh public are but little uſed, we are perſuaded, to ſee ſuch effectual checks eſtabliſhed on the expenditure of their money, more real economy exerciſed, or more minute and ſatisfactory accounts produced, than the ſeries of valuable reports furniſh, from which we have principally extracted our accounts of this truly great national undertaking. From a careful re-eſtimate of what remained to be done by Mr. Jeſſop and Mr. Telford, a well-grounded hope is held out that the whole undertaking will be entirely completed, when the ſum of 553,000*l.* is expended, except, perhaps, ſome purchaſes of land in the middle diſtrict, where no works had yet been commenced. Our inquiries further enable us to ſtate, that at the preſent time (April, 1811) the excavation in hard rock for the Corpach ſea-lock has been completed to 20 feet beneath high-water of neap tides, and a great proportion of the maſonry of the tide-lock completed; the maſonry of the great chain of eight locks near Corpach-moſs is completed, and the regulating lock near loch Lochie began: that plan, adopted for avoiding a coffer-dam to the tide lock at Clachnacharry has ſucceeded, a part of the ſpace for it had been excavated, and the water which ſprang in, eaſily commanded by a ſix-horſe engine; and the regulating lock near loch Neſs is in hand; the number of men at preſent employed exceeding 1200. Mr. John Telford, the brother of the engineer, reſided and ſuperintended the works with great ability and integrity until his death, in June 1804; ſince which the works have been ſuperintended by Mr. Matthew Davidſon.

INVERNESS-SHIRE, one of the largeſt counties of Scotland, is ſituated on the weſtern ſide of that part of the kingdom, having numerous bays of the Atlantic ocean to the weſt, the counties of Perth and Argyle on the ſouth, Roſsſhire and part of Moray Frith on the north, and the ſhires of Moray, Elgin, and Aberdeen on the eaſt. The area thus incloſed comprizes a variety of diſtricts, reſpectively named Badenoch, Lochabar, Glenelg, Glengary, Glen-Morriſon, Glenſhiel, &c. Theſe are again divided into 31 pariſhes, and comprehended, in the year 1801, a population of 74,292 perſons. A conſiderable proportion of the Hebrides or Weſtern iſles is alſo annexed to it; particularly the iſles of Sky, Harris, North and South Uiſt, Benbecula, Barra, and Eigg, and the ſmaller iſlets which are ſituated on its coaſts. The mainland, excluding the iſles, extends in length, from the point of Ariſaig on the weſt to that of Arderſeer on the eaſt, where Fort George is built, about ninety-two miles, and its greateſt breadth is nearly fifty. The county is divided into two almoſt equal parts by a valley running from ſouth-weſt to north-eaſt, parallel to the Grampians. This valley is called Glen-more-na-h'Alabin, or the "Great Glen of Albion;" and appears to be a deep fiſſure between the chains of enormous mountains which run in the ſame direction. The glen is, in the greater part of its length, filled with water; or is rather a long chain of lakes ſucceeding each other, and riſing but little above the level of the ſea; a circumſtance which has ſuggeſted the propriety of taking advantage of this valley to form the canal which is now executing acroſs the iſland, *viz.* the Caledonian canal. The freſh water lakes which form the chain from Inverneſs on the Moray Frith to the Sound of Mull below Fort William, are Loch Neſs, Loch Oich, and Loch Lochie. The diſtance, in a direct line, is little more than fifty miles, of which nearly thirty-ſix are occupied by theſe three lakes. The ſalt-water lochs, or arms of the ſea, which occupy the two extremities of the valley, are the Linnhe Loch, which advances from the ſound of Mull, on the weſt, to Fort William at the mouth of the Lochie, and the Moray Frith on the eaſt. The dimenſions of the canal are, in depth 20 feet, in width, at the bottom, 50 feet, at the top 110; the locks are 20 feet deep, 170 long, and 40 broad; frigates of 32 guns may be admitted.

Loch Lochie, the moſt weſtern of the freſh water lakes, is a fine piece of water, in length about fourteen miles, and from one to two in breadth. The mountains on each ſide are very ſteep, and in ſome parts covered with wood. The waters of this loch are chiefly derived from another to the northward, called Loch Archaig, which runs in a northern direction, ſixteen miles in length, and one in breadth. From it flows the river Archaig, which, after running about a mile, falls into the northern ſide of Loch Lochie. The river Lochie, which takes its riſe from this loch, runs weſtward, and falls into the ſea at Fort William; its length being about ten miles, and its medium breadth about two hundred feet. It is navigable by ſmall boats. Next to Loch Lochie, on the eaſtward, is Loch Oich, in length about three miles; its banks form a number of ſmall bays, and include ſome beautiful little iſlands. It gives riſe to the river Oich, which flows eaſtward, and ſoon falls into Loch Neſs. This lake is twenty-two miles long, and from one to two and a half broad; its depth in the middle being from ſixty to one hundred and thirty five fathoms. It ſometimes, eſpecially after long-continued rains, riſes eight or ten feet perpendicularly above low-water mark. The water poſſeſſes a peculiar quality; it never freezes in the ſevereſt winter, and in froſty weather is covered with a thick miſt, which has the appearance of ſmoke. At the time of the great earthquake at Liſbon, Nov. 1, 1755, the water of Loch Neſs was agitated in an extraordinary manner. It roſe rapidly, and flowed up the lake from eaſt to weſt with amazing impetuoſity; the waves being carried more than two hundred yards up the river Oich, breaking on its banks five feet above the level of the river. It continued ebbing and flowing for about an hour; when a wave, much greater than the preceding, terminated the commotion, overflowing the north bank of the lake to the extent of thirty feet. From the eaſtern extremity of Loch Neſs, riſes the river of that name, which, running in an eaſterly direction for ſix miles, falls into the Moray Frith at the town of Inverneſs, of which its eſtuary forms the harbour. This chain of rivers and lakes was made the track of a ſeries of forts, when the Engliſh government was endeavouring to ſubdue the ariſtocracy of the Highlands, and to reduce this mountainous territory under the dominion of law. The waters which fall into the eaſtern part of the chain of lakes, that is, below the head of Loch Oich, come chiefly from the ſouth; the Tarff, the Errick, and the Foyers, and a variety of other torrents, which deſcend from the mountains, where great numbers of lakes are found. The Foyers is remarkable for its celebrated falls. This river takes its riſe among the lofty mountains of Boleſkine and Abertarff, and pouring through the vale of Floyers, falls into Loch Neſs nearly mid-way between the eaſtern and weſtern extremities of that lake. The falls of Floyers are accurately deſcribed by Dr. Garnet in his Tour through Scotland. Reſpecting the upper fall, he ſtates that "from the arch of the bridge to the ſurface of the water, after the loweſt part of the fall, is 200 feet. Height of the fall 70 feet." Of the lower fall, diſtant from the former nearly half a mile, he ſays, "its height, in one continued ſtream, is 207 feet. Down this precipice the river ruſhes, with a noiſe like thunder, into the abyſs below, forming an unbroken ſtream as white as ſnow. Burns has given a beautiful deſcription of this fall. It is undoubtedly one of the higheſt in the world, and the quantity of water is ſufficient to give it conſequence. The ſcene is awfully grand; the celebrated caſcade of Niagara in North America is not much more than half the height of this." The waters which fall into the eaſtern part of the lakes from the north, are chiefly the Garry, the Morriſton, the Enneric, and Coiltie. The lakes may be conſidered as two rivers, which receive the waters of the greateſt part of Inverneſsſhire, and convey them to the eaſtern and weſtern oceans. It is ſaid that pikes are not found in thoſe lochs in the Highlands whoſe waters deſcend into the Atlantic; whereas they are found in thoſe lakes whoſe waters flow eaſtward into the German ocean. The other principal rivers in this county are the Beaulie on the north, and the Spey on the ſouth. The firſt, which is chiefly compoſed of three leſſer ſtreams, runs about eight miles before it enters the Frith of Beaulie. The river Spey riſes towards the ſouth-weſtern part of the county out of a ſmall lake of the ſame name. It receives in its courſe a great variety of mountain torrents; and paſſes through the great fir-woods of Glenmore and Strathſpey; the trees of which are conveyed to the ocean by means of its waters. To the ſouth of Loch Spey is Loch Laggan, which is fifteen miles in length, and, with its environs, forms a large diſtrict in Badenoch. On the ſouth ſide is the Coill More, or Great Wood, the moſt conſiderable remnant of the great Caledonian foreſt. Several arms of the ſea advance into the weſtern ſhore of Inverneſsſhire;

verneſsſhire; ſuch as the ſound of Sky, on which are the barracks of Bernera; Loch Hourn, Loch Neviſh, Loch Morven, Loch Aylert, Loch Sheil, and Loch Eil; the two laſt form part of the boundary between this county and Argyleſhire. Our limits will not admit a particular deſcription of the ſcenery to be met with in this extenſive county; conſiſting, as the whole ſurface of it does, of lofty mountains, which, eſpecially towards the weſt, are piled above each other in towering magnificence; and between which are deep glens of a boundleſs variety of forms, each of which has its ſtream and its lake, and many of which abound in woods. In this county ſtands the celebrated Ben Nevis, the higheſt mountain in the iſland of Great Britain; the altitude being no leſs than 4370 feet. The ſummit of this mountain affords a wide extent of view, from the horizon of the ſea at the Moray Frith on the north-eaſt to the iſland of Colonſa on the ſouth-weſt. (See Ben-Nevis.) In the eaſtern part of the pariſh of Kilmanavaig a ſingular curioſity appears, *viz.* the remarkable parallel roads of Glenroy, which are to be ſeen on the declivities of lofty mountains extending for ſeven or eight miles on each ſide of the water of Roy. Dr. Anderſon, in his View of the Agriculture of Aberdeen, ſays, "theſe roads are carried forward along the ſides of the hills in a direction every where perfectly horizontal. Wherever they come to a vacuity in the hill, there they bend inwards till they find the natural level; and where they come to a river, inſtead of ſinking down to the level of its bottom, or requiring to have a bridge directly acroſs it, to raiſe the ground to its proper level, they turn up the bank of the river, keeping ſtill their horizontal direction, till they thus gradually reach the bottom of the ſtream, when, croſſing it, and altering their direction once more, they purſue the courſe of the ſtream on the oppoſite bank till they reach the ſtrath, when they proceed forward in the ſame horizontal direction as before." Theſe parallel terraces, however, are not works of art, but natural phenomena, as ſuggeſted by Mr. Jamieſon, profeſſor of natural hiſtory in the univerſity of Edinburgh, in his Account of the Mineralogy of Dumfriesſhire. Glenroy muſt, at a former period, have been a lake, the ſurface of whoſe waters ſtood ſome fathoms above the higheſt of the parallel roads. When the river was in flood, great quantities of mud came down into the lake, but chiefly at the ſides, where the current was ſlower than in the middle. At the lower part of the glen, however, the lake, after a lapſe of ages, muſt have burſt its barriers, ſo as to reduce the ſurface of the waters to the level of ſome fathoms above the ſecond terrace. The mud formerly depoſited would now become the uppermoſt terrace. This operation muſt have been thrice repeated, to produce the three parallel roads or terraces; and at laſt the river has burſt for itſelf the channel which it now occupies, and has converted this ancient lake into a glen or deep valley. About eight miles from the mouth of the river Nevis is a remarkable cavern, known by the name of Haigh-t'-Hovile, or "Samuel's Cave;" that being the patronymic of the family of Glenevis. This cave is in the heart of a rock, which appears to be about 70 feet high, and nearly as broad, leaning to the ſide of a mount ſouth of the river, and not far diſtant from it. The cave appears to have been formed by one part of the rock inclining towards the other, and forming between them an arched, irregular, ſhapeleſs kind of grotto, from ſix to twelve or fourteen feet in height, thirty in length, and eleven in breadth. Oppoſite the rock in which the cave is formed, on the other ſide of the river, is a beautiful caſcade, falling by a gradual ſlope from Ben-Nevis, upwards of half a mile before it reaches the bottom of the valley, where it unites its ſtreams with thoſe of the Nevis. About two miles farther up the Nevis, on the cave ſide, is another caſcade, which, after forcing its way through hills and rocks, has a fall 500 feet perpendicular. The whole vicinity, as may be expected from the number of mountains, abounds with caſcades, which produce variety of picturesque ſcenery.

Such is the rude wildneſs of the mountains, rocks, and glens, that it is not wonderful the mountain chiefs and inhabitants of this country ſo long retained their independence. Not more than twenty years ago, a formidable banditti infeſted Inverneſs-ſhire. They conſiſted of deſerters and robbers, leagued together for the annoyance of the country: but the military from the forts on the lakes being ſent againſt them, the leaders were taken, the aſſociation was broken, and tranquillity reſtored.

The north-eaſtern corner of this county, adjacent to the Moray frith, is to be conſidered as a part of the Lowlands of Scotland; but all the reſt of the county belongs to the Highlands. The low country contiguous to Inverneſs is, upon the whole, well cultivated. The reſt of the eaſtern coaſt enjoys a drier climate than is to be found in the weſt. Conſiderable quantities of wheat are ſown here, together with barley, oats, and peas. Potatoes are raiſed in great abundance, and conſtitute the principal food of the poorer claſs of inhabitants. Some rye is ſown, generally mixed with oats, which gives a ſoftneſs to the oat-bread of this country. In the upper parts, and in every quarter where poſſeſſions remain on the ancient ſmall ſcale, agriculture is in a miſerable ſtate. In the remoteſt diſtricts, the harneſs of a horſe ſtill conſiſts of a bridle made of the twiſted twigs of birch; with a ſtick put under the horſe's tail, and tied with twigs, for a crupper: the ſaddle is a pad made of coarſe ſacking, faſtened with twiſted birch twigs, or hair ropes. The mountains and foreſts are inhabited by immenſe herds of red and roe deer, which roam in ſafety, in receſſes almoſt impenetrable to man: the alpine and common hare, and other game, are alſo abundant. The fir woods in Glenmore and Strathſpey, the property of the duke of Gordon and ſir James Grant, are ſuppoſed to be more extenſive than all the other natural woods in Scotland together. Indeed, in every quarter are conſiderable foreſts; and there are natural plantations of great extent near the ſeats of the different proprietors, on the ſea-coaſt or lakes. In the pariſh of Kilmalie alone, near Fort William, the wood-lands are eſtimated at about 14,000 acres. The trees that grow naturally are oak, fir, birch, aſh, mountain-aſh, holly, elm, wild geen, hazle, and the Scottiſh poplar: thoſe planted are larix, ſpruce, ſilver fir, beech, plane, and fruit trees. Lime-ſtone, approaching to the nature of marble, is found in every diſtrict of the county. In Lochaber, near the farm-houſes of Ballachuliſh, is a lime-ſtone or marble rock of an aſhen-grey colour, and of a fine regular grain or texture, capable of being raiſed in blocks or ſlabs of any ſize, and ſuſceptible of a fine poliſh. This ſingular rock is ſprinkled throughout with grains and ſpecks of bright mundic or pyrites, and of lead-ore of a fine texture, which appears to be rich in ſilver. In the farm of Blarmacfuildach, belonging to the duke of Gordon, about three miles to the ſouth of Fort William, in the bed of a river, is a very peculiar kind of marble, conſiſting of a black ground, flowered with white. This ſtone is of a fine cloſe grain, but not very hard; the flowering is light and elegant, like fine needle-work. Many of the mountains are compoſed of reddiſh granite. In the pariſh of Kingurie a rich vein of ſilver was diſcovered, but could never be ſucceſsfully wrought; and in other places, veins of lead, with ſilver intermixed, have been found. Iron ore has alſo been diſcovered, but not in ſufficient quantity to make it an object of manufacture.

This county contains many veſtiges of antiquity. In various parts are to be ſeen remains of Druidical temples. At Corymony, in the northern part of the county, is one in which the middle of the circle is occupied by a cairn of looſe ſtones, on the ſummit of which is one very large ſtone. Such temples are alſo found in the ſouthern parts. Sometimes each great ſtanding ſtone is ſupported by two other large ſtones buried under ground; ſo that where there is a ſingle circle above, there is a double one beneath.

In the pariſh of Kilmanavaig is the ruined caſtle of Inverlochy. There was, at one time, a thriving borough of the ſame name adjacent to this building, which ſome of the old Scottiſh hiſtorians call the emporium of the weſt of Scotland; but of this borough there are no other indications than ſome pavement in different places, which were probably the ſtreets of it. The caſtle has ſurvived the borough, and now ſtands alone, a monument of ancient magnificence. It is a quadrangular building, with round towers at the angles, meaſuring thirty yards every way within the walls. The towers and ramparts are built of ſtone and lime, nine feet thick at the bottom, and eight feet above. It was ſurrounded by a ditch, from thirty to forty feet in breadth, which was ſupplied with water from the river. The whole building, including the towers, covers about 1600 ſquare yards; and within the outſide of the ditch are contained nearly 7000 ſquare yards. At the great gate, between the ſouth and eaſt towers, are ſome remains of a draw-bridge. This gate is nine feet wide, and arched to the ſame height, with abutments of fourteen feet at each ſide. Directly oppoſite was another gate, of nearly the ſame ſize, which probably was deſigned as a water gate. Beſides theſe two principal entries, three of the towers were provided with ſally ports; one from each, well contrived, and cloſe to the arrow-holes, which alſo flanked and defended them. There is a tradition that this caſtle was once a royal reſidence; and that the league betwixt Charles the Great of France and Achaius king of the Scots was ſigned there on the part of the Scottiſh monarch, about the end of the eighth century. Within ſight of Inverlochy caſtle ſtood that of Dundhairdghall, on the ſummit of a hill about 400 yards in height. The traces of the building are ſtill viſible; and the part now remaining runs round the whole top of the hill, the compaſs of which is 150 yards. The part of the hall that now remains is no more than from two to four feet high, and is vitrified all round. On the northern banks of the river Lochie are the remains of an ancient caſtle, which, before the invention of fire-arms, was certainly a very ſtrong place. It ſtands on the brink of a frightful precipice, at the bottom of which the river forces its paſſage through rocks, and has been ſecured on the land-ſide by a ditch and draw-bridge. The traces of the ditch are ſtill viſible. The caſtle of Urquhart, now fallen to decay, ſtands on a rocky promontory, on the weſt ſide of Loch Neſs, of which it commands a view from one end to the other. The loch waſhes the eaſt ſide of the building, and the other three ſides were fortified with a ſtrong rampart, a ditch, and a draw-bridge. Within the walls were accommodations for five or ſix hundred men. This caſtle was a royal fort, and was granted by king James IV. in 1509, with the eſtate and lordſhip of Urquhart, to the laird of Grant, in whoſe family they ſtill continue. Along the chain of lochs are three forts, or military ſtations, deſigned to keep the Highlanders in ſubjection, Fort George, Fort Auguſtus, and Fort William. The firſt is placed at the eaſtern extremity of the lakes, and prevents all entrance up the Moray frith: it is a regular fortification, and covers ten Scottiſh acres. Fort Auguſtus is ſituated in the middle of the chain: it has four baſtions, and barracks for the accommodation of four hundred ſoldiers, with proper lodgings for the officers. On the weſt, to check any attempts from that quarter, ſtands Fort William, which is of a triangular form, with two baſtions: this has fifteen twelve-pounders, ſome mortars, and a conſiderable armoury. It was built during the uſurpation of Cromwell, under the direction of general Monk; and was then more extenſive than at preſent, as it contained two thouſand effective troops.

The remains of old watch-towers, or very ſmall fortreſſes, are to be ſeen on the ſummits of many of the mountains. In the pariſh of Laggan is a rock, upwards of an hundred yards perpendicular height, and of very difficult acceſs; yet on the very ſummit are conſiderable remains of a fortification. The area is about 500 feet by 253; the wall is upwards of fifteen feet in thickneſs. In the middle of Coil-More, the great wood on the ſouth ſide of Loch Erich, is a place called Aiſt-Merigie, or “the height on which a ſtandard was wont to be erected.” It appears to have been held ſacred from the moſt remote antiquity, and is ſaid to be the burial-place of ſeven kings of the ancient Caledonians. On a moor in Badenoch, are the remains of a ſquare encampment; which has ſuggeſted the idea that the Romans advanced into this mountainous diſtrict: in clearing ſome adjacent ground ſome years ago, an urn was found full of aſhes; alſo a Roman tripod.

In the pariſh of Kilmorack, are the ruins of the ancient priory of Beauly, which was founded in the year 1230, by James Biſſet, of Lovat. In the pariſh of Petty are two circular earthen mounds; one cloſe by the church-yard, the other about 200 yards weſt from it. Theſe are evidently artificial, the outſide being ſod or turf, incloſing ſand or light earth. The tradition concerning them is, that they were places for the adminiſtration of juſtice, as their name imports, being called Tom-inhe'it, “The Court-Hill.” In the ſame pariſh are the ruins of the Caſtle Stewart, a large old houſe, belonging to the earl of Moray. In the eaſtern corner of the county, near the Moray Frith, is Culloden-Moor, the ſcene of the memorable battle which terminated the rebellion in 1745.

The modern buildings of this county worthy of obſervation are but few, and chiefly to be found in the north-eaſtern corner. The moſt diſtinguiſhed reſidence in the county is Caſtle Grant, the ſeat of ſir James Grant, bart. It is ſituated on an eminence in the pariſh of Cromdale, on the north ſide of the Spey: the apartments contain a great variety of portraits and other paintings.

The iſlands of Barray, Benbecula, Egg, Harris, St. Kilda, Sky, North and South Uiſt, which are annexed to, or connected with, this county, will be found deſcribed under their reſpective names. Beauties of Scotland.

INVERSE, is applied to a manner of working the rule of three, or proportion, which ſeems to go backward, or contrarily to the order of the common and direct rule.

In the rule of three direct, the firſt term is to the ſecond as the third is to the fourth; that is, if the ſecond be greater than the third, or leſs than the firſt, in any proportion, the fourth is leſs than the third in the ſame proportion. But in the inverſe rule the fourth term is as much greater than the third, as the ſecond is leſs than the firſt.

In the inverſe rule, therefore, the proportion is not as the firſt is to the ſecond ſo is the third to the fourth; but as the fourth is to the firſt, ſo is the ſecond to the third. For inſtance, in the direct rule we ſay, if three yards of tapeſtry coſt twenty pounds, how much will ſix coſt? The anſwer is, forty. In the inverſe rule we ſay, if twenty working men make ten yards in four days, in how many days will forty do it? The anſwer to this, is in two days. See Rule *of Three.*

Inverse *Method of Fluxions*. See Fluxions.

Inverse *Planting*. See Planting.

Inverse *Proportion*. See Proportion.

INVERSION, the act whereby any thing is inverted, or turned backwards.

Problems in geometry and arithmetic are often proved by inverſion: that is, by a contrary rule, or operation.

Inversion, in *Grammar*, is where the words of a phraſe are ranged in a manner not ſo natural as they might be. For an inſtance: "Of all vices, the moſt abominable, and that which leaſt becomes a man, is impurity." Here is an inverſion; the natural order being this: impurity is the moſt abominable of all vices, and that which leaſt becomes a man.

An inverſion is not always diſagreeable, but ſometimes has a good effect.

Inversion, in *Muſic*, is often applied to the complements or ſupplements of intervals to the major eighth or octave; thus the major ſixth is the inverſion of the minor third, the minor ſixth the inverſion of the major third, &c. Intervals which are the inverſion of each other, always have one term of their ratios common to each, and the other terms, are one the double of the other: thus $\frac{3}{5}$ and $\frac{5}{6}$, $\frac{5}{8}$ and $\frac{4}{5}$, are inverſions of each other.

Inversion, in *Rhetoric*, is a method of confutation, by which the orator ſhews that the reaſons offered by the oppoſite party make for him. So when Cæcilius urged that the province of accuſing Verres ought to be granted to him, and not to Cicero, becauſe he had been his treaſurer in Sicily, at the time when thoſe crimes were committed with which he was charged, and conſequently knew moſt of that affair; Cicero turns the argument upon him, and ſhews, that for that very reaſon, he was the moſt unfit of any man to be intruſted with his proſecution; ſince having been concerned with him in his crimes, he would certainly do all in his power to conceal or leſſen them. (See Cæcil. c. 18.) Again, ſometimes the charge is acknowledged, but the crime ſhifted off to another. Thus when Sextius was accuſed of ſedition, becauſe he had got together a body of gladiators, and brought them into the forum, where a warm engagement happened between them and Clodius's faction; Cicero owns the fact, but charges the crime of ſedition upon Clodius's party in being the aggreſſors. (Pro Sext. c. 36.) Another method made uſe of for the ſame purpoſe is to alleviate the charge, and take off the force of it by ſhewing, that the thing was not done with that intention, which the adverſary inſinuates. Thus Cicero in his defence of king Dejotarus (cap. 8.) owns that he had raiſed ſome forces, though not to invade the Roman territories, as had been alleged, but only to defend his own borders, and ſend aid to the Roman generals. See Confutation.

Inversion *of the Uterus*. See Prolapsus *Uteri*.

INVERTED Arch, in *Engineery*, is an arch of ſtone or brick, with the crown downwards, turned in the bottoms of the locks of canals, and in the bottoms of tunnels, and of aqueducts and other bridges whenever the bottom is ſoft or liable to give way or tear up, for ſecuring the ſide walls: in locks and tunnels, the inverted arch ſhould never be omitted. See the account of conſtructing theſe in our article Canal.

Inverted *Creſcent, Point, Volt*. See the ſubſtantives.

Inverted, in *Natural Hiſtory*, is a term applied to ſuch reliquia or extraneous foſſils as have a nucleus of ſtony matter inverted or covered by the reliquium.

INVERURY, in *Geography*, an ancient royal borough in Aberdeenſhire, Scotland, is ſituated on the point of land formed by the confluence of the rivers Don and Ury. It is ſaid to have been made a royal borough by king Robert Bruce, on occaſion of a victory obtained by him, in this vicinity, over the Engliſh forces under Comyn, earl of Buchan. The oldeſt charter, however, extant, is one granted by queen Mary; the preamble of which ſtates, that "Inverury had been a royal borough time immemorial, but the charter of its erection had been loſt during the civil wars." The town is ſmall, and its increaſe and improvement have been retarded by the peculiarity of its ſituation; it being inacceſſible, excepting one ſide, with boats, and even that mode not always practicable. The ſpirited exertions of the earl of Kintore and the provoſt, Dr. Thom, have, in a great meaſure, removed this obſtacle, by promoting a public ſubſcription for building an elegant bridge over the Don, at the expence of 2000*l.*: this was completed in 1791. The borough is governed by a provoſt, three bailiffs, a dean of guild, a treaſurer, and thirteen counſellors. The return to parliament in the year 1801, ſtated the number of houſes to be 194, inhabited by 783 perſons, of whom 641 were employed in agriculture. Inverury does not appear ever to have been a place of trade.

INVESTIGATION properly denotes the ſearching or finding any thing out, by the tracts, or prints of the feet.

Hence, mathematicians, ſchoolmen, and grammarians, came to uſe them in their reſpective reſearches.

Investigation *of a Theme*, is the art, method, or manner of finding the themes of verbs, that is, the primitive tenſe, mood, and perſon, of any verb, far removed from its ſource. To underſtand a Greek author, it is abſolutely neceſſary to be well acquainted with the method of inveſtigating a theme. This theme, in the Greek tongue, is the preſent tenſe of the indicative mood.

Clenard was the firſt who introduced this term into grammar: he gives the title *inveſtigatio thematis* to that part where he teaches the manner of finding whence any perſon, or tenſe, or verb, proceeds, and of reducing it to its primitive word, or finding its indicative.

INVESTING, the act of conferring on any one the right or property of a fee, dignity, or office, or of ratifying and confirming what has been obtained elſewhere.

The emperors pretend to a right of inveſting ſeveral princes both in Germany and Italy. There was formerly a particular ceremony for the inveſting of biſhops. After the election of a knight of the Garter, he is inveſted by the ſovereign with two principal enſigns of the order, the Garter and George. Before his inſtallation he is alſo inveſted with the habit of the order.

Investing, in the *Military Art*, ſignifies the opening a ſiege, and the encamping of an army round the place; to block up its avenues, and prevent all ingreſs and egreſs. In order to do this effectually, the general in chief of the approaching army muſt detach a large body of cavalry, together with the different corps of dragoons, under the command of a lieutenant-general, for the purpoſe of regularly inveſting the place. Sometimes a place is partially inveſted, for the ſole purpoſe of diverting the enemy's attention from the real object, and of inducing him to weaken the garriſon by detaching it to different quarters.

Investing, in *Common Law*, ſignifies the putting in poſſeſſion. A tenant is inveſted by giving him a verge, or rod, into his hands, and adminiſtering an oath.

Others define it thus: *inveſtire eſt in ſuum jus aliquem introducere*, to give livery of ſeiſin, or poſſeſſion. See LIVERY and SEISIN. See alſo FEOFFMENT.

INVESTITURE, is uſed both for the right, and the act, of inveſting a tenant, or vaſſal; that is, of receiving the faith and homage by which a vaſſal becomes ſeiſed, and poſſeſſed of a fee, by his lord. See FEE.

Inveſtitures, in their original riſe, were probably intended to demonſtrate in conquered countries the actual poſſeſſion of the lord; and that he did not grant a bare litigious right, which the ſoldier was ill qualified to proſecute, but a peaceable and firm poſſeſſion. And at a time, when writing was ſeldom practiſed, a mere oral gift, at a diſtance from the ſpot that was given, was not likely to be either long or accurately retained in the memory of byſtanders, who were very little intereſted in the grant. Afterwards they were retained as a public and notorious act, that the country might take notice of and teſtify the tranſfer of the eſtate, and that ſuch as claimed title by other means, might know againſt whom to bring their actions.

Inveſtiture was anciently performed by rehearſing a formula of words; afterwards by the delivery of ſuch things as had the neareſt reſemblance to what was transferred. Thus, land paſſed by the delivery of a turf: and to ſhew the trees were transferred at the ſame time, a bough was cut and delivered along with it.

In after-times, the things by which inveſtitures were made were not ſo ſtrictly obſerved. Many were inveſted by the delivery of a ſtaff, a glove, a knife, a piece of a cloak, of a ſtrap, and a girdle: or by pricking the thumb, by giving the keys, a ſpit, a blow, a ring, a turf, a bough, a ſtraw, &c. The inveſtiture of a kingdom or lordſhip, was performed by a ſtandard, a banner, a cap, a ſword, a bow, arrows, ſpurs, &c.

The ſymbols were ſometimes preſerved in the repoſitories of the houſes, and were annexed to the titles.

INVESTITURES were alſo uſed with reſpect to ſpiritual benefices. Theſe were frequently performed by delivering the croſier and paſtoral ring.

The kings of England and France, the emperor of Germany, &c. had formerly this right; ſo that on the death of a prelate, his clergy ſent the croſier, &c. to their ſovereign, to be uſed at the ceremony of inveſting his ſucceſſor. It is not certain when this cuſtom began; Cardinal Humbert places the commencement of it in the reign of Otho the Great: and it appears, that in the ninth century, the greater part of the European princes made no oppoſition to the right of electing the biſhops, which was both claimed and exerciſed by the clergy and the people. The firſt who diſputed this privilege with the emperors and ſovereign princes, was Gregory VII.; he excommunicated the emperor Henry IV. and forbade all eccleſiaſtics, under pain of excommunication, to receive inveſtiture at the hands of ſecular princes. This occaſioned a long and bloody war; the civil and eccleſiaſtical powers being divided into two great factions, of which one maintained the rights of the emperor, while the other ſeconded the ambitious views of the pontiff. The laws of Gregory for the abolition of inveſtitures were confirmed and renewed by Victor III. and Urban II. the laſt of whom not only confirmed the laws and anathemas of Gregory, in a council aſſembled at Placentia in the year 1095; but publiſhed alſo a prohibitory law in the council of Clermont, forbidding the biſhops and the reſt of the clergy to take the oath of allegiance to their reſpective ſovereigns. Paſcal II. in a council aſſembled at Rome, A.D. 1102, renewed the decrees of his predeceſſors againſt inveſtitures and the excommunications they had thundered out againſt Henry IV. Paſcal, however, was obliged, in 1111, to confirm Henry V. in the right of giving inveſtitures; but repenting what he had done, he aſſembled a council in the church at Lateran, in 1112, which ſolemnly annulled his treaty with the emperor, who was excommunicated in many ſynods and councils, both in France and Germany. At length, however, Calixtus II. engaged him to renounce inveſtiture on certain conditions, and peace was concluded between the emperor and the pope's legates, at a general diet held at Worms, A.D. 1122. This convention was confirmed the following year in the general council of Lateran, and remains ſtill in force.

INVISCATIO, a ſticking of the eye-lids together.

INULA, in *Botany*, ſo named by Pliny. This appellation is contracted or corrupted, ſays profeſſor Martyn, from *Helenium*, Dict. ελενιον; fabled to have ſprung from the tears of Helen. Linn. Gen. 426. Schreb. 557. Willd. Sp. Pl. v. 3. 2089. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 890. Ait. Hort. Kew. v. 3. 222. Juſſ. 181. Lamarck Dict. v. 3. 253. Illuſtr. t. 680. Gærtn. t. 170. (Enula; Cæſalp. and Magnol.—Helenium; Gerard. em. 793. Vaill. Mem. Acad. Paris. 1720.) Claſs and order, *Syngeneſia Polygamia Superflua*. Nat. Ord. *Compoſitæ Diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* imbricated; ſcales looſe, ſpreading, the exterior ones larger, of equal length. *Cor.* compound, radiated, broad; *florets* of the diſk all perfect, equal, very numerous, funnel-ſhaped, with a five cleft ſtraightiſh limb: thoſe of the radius female, ligulate, numerous, crowded together, linear, entire. *Stam.* (in the tubular florets) Filaments five, thread-ſhaped, ſhort; anthers cylindrical, compoſed of five ſmaller, linear, conjoined ones; each ending below in two ſtraight briſtles, the length of the filaments. *Piſt.* (in the tubular florets) Germen long; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma bifid, ſomewhat erect. The female or ligulate florets differ in having the ſtyle cloven but half way down, and the ſtigma quite erect. *Peric.* none, except the unchanged calyx. *Seeds* in the florets of the diſk as well as the radius, ſolitary, linear, quadrangular. *Down* capillary, the length of the ſeeds. *Recept.* almoſt naked, flat.

Eſſ. Ch. Receptacle nearly naked. Down ſimple. Calyx imbricated. Florets of the radius very numerous, linear. anthers with two briſtles at the baſe.

Obſ. This genus differs not only from *Aſter*, but from moſt others, in having the anthers terminated below by ten briſtles, though this character is not apparent in all the ſpecies. *Inula* is an extenſive genus, Willdenow having enumerated thirty-five ſpecies, from which number we ſelect for deſcription the only four which are natives of this country: theſe are,

1. I. *Helenium*, Elecampane. Linn. Sp. Pl. 1236. Engl. Bot. t. 1546. Woodv. Med. Bot. v. 2. t. 108.—"Leaves claſping the ſtem, ovate, rugged, downy beneath. Scales of the calyx ovate."—Found in moiſt rich paſtures and meadows in various parts of Britain, but not common, flowering in July and Auguſt. *Stems* about four feet high, leafy, downy, branched in the upper part. *Leaves* ovate, ſlightly ſerrated, veiny, downy beneath. *Flowers* large, terminal, of a fine golden yellow.

The ancients entertained a very high opinion of the virtues of this plant, and "in gardens it is ſtill cultivated occaſionally, for the ſake of its root, which is perennial, large and fleſhy, abounding with mucilage, combined with an aromatic,

matic, bitter flavour, and ſome acrimony. Theſe qualities render it uſeful to promote expectoration.

Horace was acquainted with its fame, for we find it celebrated by that poet in two of the ſatires in his ſecond book.

> ——————— cum rapula plenus
> Atque acidas mavult *inulas*. Sat. 2. v. 44.

And alſo in ſat. 8. v. 51.

> Erucas virides, *inulas* ego primus amaras
> Monſtravi incoquere.———

2. I. *dyſenterica*. Common Fleabane. Linn. Sp. Pl. 1237. Engl. Bot. t. 1115. Curt. Lond. faſc. 3. t. 56.—"Leaves oblong, claſping the ſtem with their heart-ſhaped baſe, downy. Stem woolly, panicled. Calyx-ſcales briſtle-ſhaped, hairy."—Native of clear ditches and moiſt places, flowering in Auguſt.—*Root* creeping and perennial. *Stem* branched in a panicled or corymboſe manner. *Leaves* waved and ſlightly toothed at their margin; their under ſide denſely clothed with hoary down. *Flowers* numerous, terminal, of a full bright yellow. The herb is viſcid to the touch, exhaling a peculiar ſharpiſh aromatic ſcent, not unlike that of a peach.

Mr. Relhan mentions a variety of this ſpecies with very ſhort rays, and Linnæus, in the *Flora Suecica*, obſerves that the Ruſſians were cured of the bloody flux by this plant, in their expedition againſt the Perſians, whence its ſpecific name.

3. I. *pulicaria*. Small Fleabane. Linn. Sp. Pl. 1238. Engl. Bot. t. 1196. Curt. Lond. faſc. 3. t. 57.—"Leaves claſping the ſtem, waved. Stem much branched, hairy. Flowers hemiſpherical, with a very ſhort radius."—Found on moiſt ſandy heaths and commons, where water has ſtagnated, and flowering late in autumn.—*Root* annual, tapering and branched. *Stem* generally erect, ſometimes ſpreading or decumbent, zigzag, angular. *Leaves* lanceolate or oblong, hairy on both ſides. *Flowers* ſolitary, of a pale dull yellow. There is a variety of this which has ſcarcely any flowers of the radius.

4. I. *crithmoides*. Samphire-leaved Fleabane. Linn. Sp. Pl. 1240. Engl. Bot. t. 68.—"Leaves linear, fleſhy, generally three-pointed. Calyx ſmooth."—This is a maritime plant, which thrives in a muddy ſoil, and is rather ſcarce. It flowers in Auguſt.—*Root* perennial, fibrous. *Leaves* alternate, ſmooth and ſucculent, ſalt to the taſte, thoſe about the centre of the *ſtem* generally furniſhed with a tooth on each ſide of the tip. *Flower* ſolitary, very handſome, having yellow rays and an orange diſk. *Down* rough, bluſh-coloured.

The remaining ſpecies are *I. odora*, *Oculus Chriſti*, *britannica*, *indica*, *arabica*, *ſpiræifolia*, *japonica*, *ſquarroſa*, *viſcoſa*, *ſalicina*, *grandiflora*, *glanduloſa*, *bubonium*, *hirta*, *ſuaveolens*, *Vaillantii*, *mariana*, *dubia*, *orientalis*, *germanica*, *enſifolia*, *provincialis*, *montana*, *æſtuans*, *bifrons*, *cærulea*, *aromatica*, *ſaturejoides*, *pinifolia*, *fœtida*.

Inula, in *Gardening*, comprehends plants of the herbaceous and ſhrubby kinds; of which the ſpecies principally cultivated are the common inula or elecampane (I. helenium); the creeping-rooted inula (I. britannica); the willow-leaved inula (I. ſalicina); the canary inula (I. canarienſis); the ſavory-leaved inula (I. ſatureioides); and the ſhrubby inula (I. fruticoſa.)

There are ſome other ſorts that may likewiſe be cultivated.

Method of Culture.—The firſt of theſe ſorts may be propagated by ſeeds ſown in autumn, ſoon after they are ripe, on a warm, loamy, rather moiſt border. The plants ſhould be tranſplanted to the places where they are to grow in the following autumn.

But the common practice is to increaſe it by offſets, which, when taken from the old roots carefully, with a bud or eye to each, take root eaſily: the beſt ſeaſon is the autumn, as ſoon as the leaves begin to decay; planting them in rows about a foot aſunder, and nine or ten inches diſtance in the rows. The following ſpring the ground ſhould be kept clean from weeds, and be ſlightly dug over in the autumn following. The roots will be fit for uſe after two years growth, but will abide many years if permitted to ſtand.

The two following ſorts may be increaſed by parting the roots, and planting them in the autumn, in the borders or other places where they are to remain. They ſhould not be removed oftener than every three years.

The fourth and fifth ſorts may be raiſed by planting cuttings of the branches, in the ſummer ſeaſon, in pots of light earth, in ſhady borders. They muſt be removed into ſhelter in autumn, but ſhould have as much free air as poſſible at all times, when the weather is mild. In cold weather the firſt ſhould have but very little water, as the ſtalks and leaves, being ſucculent, are very apt to rot. In ſummer they ſhould be placed abroad with other hardy exotic plants, in a ſheltered ſituation.

The laſt ſort is propagated by ſeeds procured from places where it grows naturally. Theſe muſt be ſown in pots, or upon a hot-bed, and when the plants are fit to remove, be each put into a ſmall pot filled with light earth, and plunged into a freſh hot-bed; treating them in the ſame manner as other ſimilar tender plants. It requires to be kept conſtantly in the ſtove.

The firſt ſort may be cultivated for the medicinal uſe of the roots, or for ornament, in large borders.

The two following ſorts may have places in the ſame way.

The fourth and fifth kinds afford variety among other potted green-houſe plants, and the laſt among ſtove-plants.

Inula *Helenium*, in the *Materia Medica*. See Elecampane.

INVOCATION, in *Theology*, an act whereby we adore God, and call on him for his aſſiſtance.

The Romaniſts alſo practiſe invocation of ſaints, begging them to intercede with God in their behalf. This is one of the grand articles of diſpute between the Romaniſts and the Reformed.

Invocation, in *Poetry*, an addreſs at the beginning of a poem, wherein the poet calls for the aſſiſtance of ſome god, particularly of his Muſe, or the deity of poetry. See Muses.

This part is abſolutely neceſſary in an epic poem, becauſe the poet relates things which he could not be ſuppoſed to know, unleſs ſome deity inſpired him. Beſides, this ſerves his readers as an example of piety and devotion, which ought to be the foundation of this whole work. To theſe it may be added, that the gods themſelves are to have a part in the action; and it is not decent he ſhould ſet them to work, without firſt aſking them leave.

Indeed, in the courſe of an epic poem, there are uſually ſeveral invocations; particularly where any thing extraordinary, or miraculous, comes to be related; as that when Virgil deſcribes the metamorphoſis of Æneas's fleet into ſea nymphs: but the firſt invocation is always the moſt conſiderable.

In the invocation Boſſu conſiders two things: the firſt is what the poet requeſts; the ſecond, to what deity he addreſſes his requeſt. As to the firſt, Homer has joined the invocation ſo cloſely to the propoſition, that he ſeems to invoke his Muſe for the whole work. But Virgil, on the contrary, only requeſts his Muſe to furniſh him with a part of his ſubject; and even mentions what particular part it is he deſires. After propoſing his matter in all its extent, he begs the Muſe to acquaint him with the cauſe of it. See Proposition.

As to the deity invoked, the ſame author obſerves, that it muſt always be, either the divinity that preſides over poetry in general, or that which preſides over the particular ſubject of the work. Ovid's invocation, in the Metamorphoſes, is of the latter kind; and ſo is that of Lucretius; thoſe of Homer and Virgil are of the former kind; they only invoke the Muſes; and thus they diſtinguiſh between the divinities who preſide over poetry, and thoſe who preſide over the actions of the poem, and have parts in it.

By the way, it may be obſerved, that the deities invoked are not looked on, even by the poets themſelves, as divine perſonages from whom they expect any real aſſiſtance. Under the name of Muſe they wiſh for the genius of poetry, and for all the qualities neceſſary for the execution of their deſign. Theſe are mere allegories, or manners of expreſſing themſelves poetically; juſt as when they perſonify and make gods of ſleep, of reſt, fame, and other natural and moral things. And thus the Muſes come to be of all ages, countries, and religions; there are Pagan, Chriſtian, Greek, Latin, and Engliſh Muſes.

INVOICE, or Invoyce, a liſt, or account of commodities, with their value, cuſtoms, proviſion, charges, &c. ſent by a merchant to his factor, or correſpondent, in another country.

Invoice, *Book of.* See Book.

INVOLUCELLUM, in *Botany.* See the following article.

INVOLUCRUM, a term adopted by Linnæus, at the ſuggeſtion of Artedi, for the row of ſmall leaves found at the baſe of the umbels in moſt umbelliferous plants. That of the general umbel is termed the *General Involucrum;* that of each partial one a *Partial Involucrum,* in Latin *Involucellum.* The ſame word is uſed for what might be more properly called Bracteas in *Euphorbia* and other genera, and Linnæus has probably erred in reckoning the *involucrum* a ſpecies of calyx in any inſtance. In ferns, however, we retain this appellation for the membranous covering of their fructification, in preference to a newly invented term *induſium.*

INVOLUNTARY *Diſcharge of Urine.* See Incontinence *of Urine.*

Involuntary *Motion.* See Motion.

INVOLUTE Curve, in the *Higher Geometry.* See Evolute.

INVOLUTION, in *Algebra,* the raiſing any quantity from its root to any height, or power, aſſigned. See Power.

Any quantity multiplied by itſelf, the product is the ſquare of that quantity; the ſquare being again multiplied by the quantity, produces its cube. See Square and Cube.

Thus if $a + b$ were to be raiſed to its ſecond power, it will produce $a\,a + 2\,a\,b + b\,b$.

And if it be involved again, or if that ſquare be multiplied by the root, the cube or third power will be produced; *viz.* $a\,a\,a + 3\,a\,a\,b + 3\,a\,b\,b + b\,b\,b$, &c. ſo that the involution of any compound quantity is performed by a continual multiplication of it by itſelf: if the powers of $a - b$ are required, they will be found the ſame as thoſe of $a + b$, except that the terms in which the exponent of b is an odd number will be negative, becauſe an odd number of multiplications of a negative produce a negative; or, in general, the terms of any power of $a - b$ are poſitive and negative by turns. See Binomial *Theorem.*

If a quantity, conſiſting of three or more terms, is to be involved, it may be diſtinguiſhed into two parts, which are to be raiſed to any power in the ſame manner as a binomial: and then by the ſame rules, the value of theſe compound parts may be ſubſtituted in their ſtead: thus, $\overline{a + b + c}|^2 = \overline{a + b + c}|^2 = \overline{a + b}|^2 + 2\,c \times \overline{a + b} + c^2 = a^2 + 2\,a\,b + b^2 + 2\,a\,c + 2\,b\,c + c^2$. And $\overline{a + b + c}|^3 = \overline{a + b}|^3 + 3\,c \times \overline{a + b}|^2 + 3\,c^2 \times \overline{a + b} + c^3 = a^3 + 3\,a^2\,b + 3\,a\,b^2 + b^3 + 3\,a^2\,c + 6\,a\,b\,c + 3\,b^2\,c + 3\,a\,c^2 + 3\,b\,c^2 + c^3$. The reverſe of involution is called *evolution.* See Extraction *of* Roots, and Root.

INWARD *Flanking Angle,* in *Fortification.* See Angle.

JOACHIM, in *Biography,* a celebrated Italian monk, was born at Celico, near Coſenza, in the beginning of the 12th century. After he had received a common education, his father obtained for him a poſt at the court of Naples, in which he ſerved ſome time. After this he took the reſolution of viſiting the holy places in Paleſtine, left Naples, without communicating his deſign to his father, and reached Conſtantinople, where he made a ſhort ſtay. While in this city he was ſo alarmed at the extraordinary mortality produced by a peſtilential diſorder, that he made a vow to renounce the world, and, having aſſumed the habit of a hermit, proceeded barefoot on his journey. On his return he entered into the order of Ciſtercians, and founded ſeveral monaſteries, which he governed with great diſcretion. He was regarded by many of his contemporaries as a prophet, and ſeveral of his predictions were printed, in a book entitled "The Everlaſting Goſpel." He was author of other works, particularly of "A Harmony of the Old and New Teſtament." He died in the year 1202, at the age of 90. His followers wiſhed to perſuade the world that miracles were wrought at his tomb, and applied to the pope to canonize him, but this was rejected on account of the numerous errors contained in his works. Moreri. See Joachimites.

Joachim, George, a celebrated mathematician and aſtronomer in the 16th century, was born, in 1514, at Feldkirk, in the Tyrol. He was educated at Zurich, where he ſoon diſcovered a ſtrong inclination for mathematical purſuits, in the elements of which he was initiated at that place. Afterwards he went to Wittemburg, where he proſecuted his ſtudies with ardour and ſucceſs. In the year 1555 he was admitted to the degree of M. A., and in two years afterwards he was appointed joint profeſſor of the mathematics with Reinhold. He was a zealous and able defender of the Copernican ſyſtem of the world; went into Pruſſia, where he placed himſelf under the tuition of Copernicus himſelf, and became the editor of his great work, entitled "De Revolutionibus." While Joachim continued in Pruſſia, to render aſtronomical calculations more ready and accurate, he began an elaborate canon of ſines, tangents, and ſecants, to fifteen places of figures, and to every ten ſeconds of the quadrant. He did not live to accompliſh this great work, but the canon of ſines for every ten ſeconds, and for every ſingle ſecond in the firſt and laſt degree of the quadrant, computed by him, was publiſhed at Frankfort in 1613, by Pitiſcus; the larger work was perfected and publiſhed after his death in 1596, by his diſciple Valentine Otho. Joachim returned from Pruſſia in 1543, and was again admitted to his profeſſorſhip of mathematics at Wittemburg; he afterwards was elected to fill the mathematical chair at Leipſic. He died in 1576, in the ſixty-ſecond year of his age, leaving behind him "Narratio de Libris Revolutionum Copernici;" firſt publiſhed at Dantzic in 1540. He alſo compoſed and publiſhed "Ephemerides," according to the doctrine of Copernicus, till the year 1551. Moreri. Hutton.

JOACHIM, *St.*, in *Geography*, a town of South America, in the kingdom of Granada, on the Mata; 240 miles E. of Santa Fé de Bogota.—Alſo, a town of South America, in the province of Moxes; 150 miles N.N.E. of Trinidad.—Alſo, a town of Canada, on the river St. Lawrence. N. lat. 47° 5′. W. long. 70° 45′.

JOACHIM *de Omaguas*, *St.*, a town of South America, in the audience of Quito, on the river Amazons; 400 miles S.E. of Quito. S. lat. 4° 40′. W. long. 72° 30′.

JOACHIMITES, in *Eccleſiaſtical Hiſtory*, the name of a ſect, the followers of one Joachim, abbot of Flora, in Calabria, who was eſteemed a prophet while he lived, and left, at his death, ſeveral books of prophecies, contained in his Everlaſting Goſpel, commonly called the book of Joachim, beſides other works; which were condemned, in 1215, by the council of Lateran; and by the council of Arles, in 1260.

One of the ſpiritual friars, named Gerhard, belonging to the order of Franciſcans, undertook to explain the Everlaſting Goſpel of Joachim, in a book publiſhed in 1250, entitled "The Introduction to the Everlaſting Goſpel." In this work St. Francis is declared to be the angel mentioned in the Revelation, xiv. 6. who had promulgated the true and everlaſting goſpel of God: it is alſo aſſerted, that the goſpel of Chriſt was to be abrogated in 1260, and this new goſpel to be publiſhed in its room; and that the miniſters of this ſignal reformation were to be humble and barefooted friars, deſtitute of all worldly emolument. This abſurd book was ſuppreſſed by order of pope Alexander IV. in 1255, and at length publicly committed to the flames.

The Joachimites were particularly fond of certain ternaries: the Father, ſaid they, operated from the beginning till the coming of the Son; the Son from that time to theirs, *viz.* the year 1260; and the Holy Spirit then took it up, and was to operate in his turn. Hence they divided every thing that related to men, time, doctrine, and manner of living, into three claſſes, or ſtates, according to the three perſons in the Trinity; every one of which ſtates either had already, or was hereafter to ſucceed in its turn; and hence they called the diviſions *ternaries*.

The explication given by Joachim, of the Trinity, in oppoſition to Peter Lombard, which was conſidered by many as differing little from the Arian ſyſtem, procured the damnatory ſentence of his doctrine by Innocent III. in the council of Lateran; but notwithſtanding this papal ſentence Joachim has ſtill a conſiderable number of adherents and defenders, more eſpecially among thoſe of the Franciſcans, who are called Obſervants, or Friars obſervant.

JOACHIMSTHAL, in *Geography*, a town of Bohemia, in the circle of Elnbogen, celebrated for its ſilver mines, which were diſcovered in the year 1516, and which yielded from the year 1586, to the year 1601, 305,790 marks of ſilver; 52 miles S.S.E. of Dreſden. N. lat. 50° 20′. E. long. 12° 53′.—Alſo, a town of Brandenburg, in the Ucker Mark; 31 miles N.N.E. of Berlin. N. lat. 53° 5′. E. long. 13° 55′.

JOAG, a town of Africa, in the country of Kajaaga; which Mr. Park ſuppoſes to have contained about 2000 inhabitants. It is ſurrounded by a high wall, in which is a number of port holes, from which muſkets may be fired in caſe of an attack; and every man's poſſeſſion is likewiſe ſurrounded by a wall. To the weſtward of the town is a ſmall river, on the banks of which are cultivated conſiderable quantities of tobacco and onions. N. lat. 14° 25′. W. long. 9° 38′.

JOAL, a town of Africa, in the kingdom of Sin, ſituated on the ſea-coaſt, with a good road and anchorage; where the French had a factory for ſlaves, ſkins, ivory, and wax.

JOAN I., in *Biography*, queen of Naples, eldeſt daughter of Charles duke of Calabria, ſon of Robert king of Naples, was born about the year 1326. Her father died while ſhe was very young, and Robert immediately betrothed her to Andrew, ſecond ſon of Charles king of Hungary, who was her couſin, and who was then ſent to Naples to be educated. On the death of Robert in 1643, Joan was proclaimed queen. She had already conceived a great averſion from her huſband, which was increaſed by the idle tales of her attendants, and was now determined to hold all power in her own hands; but the pope, who was in his intereſt, granted a bull for the coronation of Andrew, as king in his own right. Joan was ſuſpected of harbouring an attachment for Lewis, prince of Tarento; and ſhe was accuſed of being privy to the murder of Andrew, who was taken off at the inſtigation of the princes of the blood, to prevent, as they thought, the kingdom from falling into the hands of the Hungarians. The king of Hungary determined to revenge himſelf upon the perpetrators of his brother's aſſaſſination, and advanced with a large army into Naples; the queen, who had already married the prince of Tarento, fled into Provence, and all Naples fell under the dominion of Lewis the Hungarian monarch. Joan went to Avignon, and was received with great reſpect by pope Clement VI. and the cardinals, before whom ſhe underwent a formal trial on account of her huſband's death. She pleaded her cauſe with eloquence, and was declared not only innocent, but free from all ſuſpicion. With this deciſion the king of Hungary ſeems to have been ſatisfied, and immediately returned to his own dominions. Joan was now invited by the Neapolitan barons to reſume her crown; ſhe accordingly fitted out a fleet, and re-entered Naples with general acclamations in 1348. She was next engaged in a conteſt with the king of Hungary, which proved ſo much againſt her, that ſhe was obliged to ſeek a ceſſation of arms, which was granted by the king, on the condition that ſhe ſhould abide the event of another trial before the papal court. Upon the iſſue of this was to be determined the poſſeſſion of the kingdom of Naples. Joan now had recourſe to a different kind of defence, and ſhe pleaded in excuſe that ſhe was under the influence of witchcraft at the time, which rendered her averſe from her huſband, and encouraged others to conſpire againſt him. This plea ſerved her purpoſe, and ſhe was declared blameleſs of all actions committed ſubſequent to the ſuppoſed faſcination. She was left in the peaceable poſſeſſion of her throne, and was again crowned, with her huſband Lewis, in the city of Naples. Lewis died in 1362, and in the courſe of a few months ſhe married James of Arragon, called the Infant of Majorca, whom ſhe did not allow to aſſume a higher title than duke of Calabria. This prince died in 1375, and in the following year ſhe took a fourth huſband, *viz.* Otho, of the houſe of Brunſwick, an accompliſhed ſoldier and handſome man, on whom ſhe conferred the title of duke of Tarento, with a large eſtate. Having no children, the one by Andrew being dead, ſhe adopted as a ſucceſſor her relation Charles de Duras, who revolted againſt her at the inſtigation of the king of Hungary. She then adopted for her heir Lewis of France, duke of Anjou, which produced a bloody war. Charles, however, was a native prince, and being more agreeable to the wiſhes of the Neopolitans than a foreigner, he marched to Naples, and being joined by the barons, he found little or no difficulty in getting poſſeſſion of the kingdom. The queen was obliged to capitulate, ſhe was impriſoned, and after a few months was put to death. This event occurred in 1382, in the thirty-ninth year of her reign. She was a woman of great accompliſhments, and poſſeſſed many good qualities, though ſullied by early diſſoluteneſs. She was the friend and patron of men of learning. Univer. Hiſt. Bayle.

Joan *of Arc.* See Arc.

Joan, *Pope:* a ſhort notice muſt be taken of this character, as being frequently referred to, though it is now generally regarded as merely fictitious. It is ſaid, that about the middle of the ninth century, a woman named Joan, born at Mentz, and who had received an excellent education, conceiving a violent paſſion for a young monk named Fulda, reſolved to deſert her family and friends to aſſume the male habit, and gain admittance into the monaſtery. The plan ſucceeded, and having long indulged in their amours undiſturbed and unſuſpected; they eloped together, and travelled into moſt of the countries of Europe, availing themſelves of every opportunity for increaſing their knowledge, by engaging the aſſiſtance of the beſt maſters in the different cities through which they paſſed. On the death of her lover, Joan repaired to Rome, ſtill in the dreſs of a man; her addreſs, and engaging manners raiſed her into notice; ſhe commenced the duties of profeſſor, and perſons of the higheſt rank and moſt conſiderable talents enliſted in the number of her diſciples. At length, on the death of pope Leo. X. in 855, ſhe was unanimouſly elected his ſucceſſor to the pontifical throne. So prudently did ſhe conduct herſelf, and with ſo much ability did ſhe perform the duties of her ſtation, that the people had reaſon to congratulate themſelves on their choice. At length ſhe confided her ſecret to a domeſtic whom ſhe took to her bed, the conſequence of which was her pregnancy, and ſhe was taken in labour at one of the moſt ſolemn proceſſions, delivered of a child in the ſtreet, and died on the ſpot. It is likewiſe ſaid, that to perpetuate the memory of ſuch an extraordinary adventure, a ſtatue was erected on the place where it happened; that in abhorrence of the crime, the pope and clergy in their ſubſequent annual proceſſions from the Vatican to the Lateran have turned off from that ſtreet; and that to prevent a ſimilar impoſition, a cuſtom was introduced of examining each pope previouſly to his conſecration, in order to aſcertain his ſex. Such are the particulars of a ſtory that ſeems not to have been called in queſtion till the time of Luther, but which the beſt informed hiſtorians uſually abandon as fictitious. "Till the reformation," ſays Gibbon, "the tale was repeated and believed without offence, and Joan's female ſtatue long occupied her place among the popes in the cathedral of Sienna. She has been annihilated by two learned Proteſtants, Blondel and Bayle, but their brethren were ſcandalized by this equitable and generous criticiſm. Spanheim and L'Enfant attempted to ſave this poor engine of controverſy; and even Moſheim condeſcends to cheriſh ſome doubt and ſuſpicion."

Joan d'Albert, queen of Navarre, daughter of Henry d'Albert, and Margaret of Valois, was born in 1528. In 1548, ſhe married Antony of Bourbon, duke of Vendome, by whom ſhe had, as a third ſon, the afterwards celebrated Henry IV. of France. At the deceaſe of her father, in 1555, ſhe became queen of Navarre, and her huſband took the title of king. They were both favourable to the principles of the reformation, and would probably have openly profeſſed it had they not feared the reſentment of the king of France, but after his death they declared their converſion to Calviniſm, of which Joan was ever after the zealous protector. Antony, on the other hand, was fickle and weak, renounced his new faith, and was a principal commander in the civil war againſt the Proteſtants, in which he loſt his life at the ſiege of Rouen, in 1562. Joan not only eſtabliſhed the Proteſtant religion in her ſtates, but aboliſhed popery, and ſeized the property of the eccleſiaſtics, which ſhe applied to the maintenance of the reformed clergy and the ſchools. In 1568, ſhe quitted her ſtates to join the chiefs of the French Proteſtants, and at Cognac had an interview with the prince of Condè, to whom ſhe preſented her ſon, then of the age of fifteen, with her jewels, as devoted to the ſervice of the cauſe. She next withdrew to Rochelle, whence ſhe wrote a pathetic letter to queen Elizabeth of England, deſcribing the calamities and oppreſſions which had induced the Proteſtants to take up arms. She died in 1572, at Paris, whither ſhe had come to make preparations for the marriage of her ſon with the ſiſter of Charles IX. Her death was not without ſuſpicion of poiſon, though the fact was never aſcertained.

JOANA, in *Geography*, a town on the north coaſt of the iſland of Java, ſituated on a river of the ſame name, which is the largeſt and moſt navigable along this coaſt. It is here more than 20 feet deep, and about 200 feet broad. It flows out of a large inland lake, into which ſeveral ſmall ſtreams diſcharge themſelves, and falls into the ſea about four leagues to the weſtward of Rembang. The town conſiſts of two rows of houſes built along the river, about a quarter of a Dutch mile in length. The fort of Joana is a redoubt, with four demi-baſtions, in which are the rice warehouſes, the barracks for the ſoldiery, and ſome buildings which ſerve for a kitchen and other offices for the reſident. The emoluments of this reſidency amount to 16,000 rix-dollars, or about 3500*l.* ſterling. This town yields rice and timber, a little indigo and cotton.

JOANNA, Johanna, or *Hinzuan*, one of the Comora iſlands, about 30 miles long and 15 broad. The Abbé Raynal deſcribes this iſland in terms of high commendation. Hills, he ſays, that are ever green, and vallies that are always gay, every where preſent a variety of delightful landſcapes. Thirty thouſand inhabitants, diſtributed into 73 villages, ſhare its productions. They ſpeak a corrupt dialect of the Arabic language, and their religion is a corrupt kind of Mahometaniſm: their moral principles are more refined than they uſually are in this part of the globe. Accuſtomed to the plain diet of milk and vegetables, they are averſe from labour. Among perſons of diſtinction, who indulge themſelves in eaſe and indolence, the nails of the fingers are ſuffered to grow to an immoderate length, and in order to give this effect of negligence the appearance of beauty, they tinge their nails with a yellow red, which they obtain from a ſhrub called *Alcanna*, which ſee. Sir Willliam Jones, who touched at this iſland, in his voyage to India, was much pleaſed with the beautiful ſcenery which its verdant hills and mountains, covered with elegant palms and other trees, preſented to his view. He particularly mentions the town of Matſamudo, diſtinguiſhed at a diſtance by the tower of the principal moſque, and another ſmall town called Bantani. For an account of his rambles through part of the iſland, and his intercourſe with ſome of the principal inhabitants, we muſt refer to his "Remarks" on this iſland, in the ſecond volume of the Aſiatic Reſearches. Other voyagers who have viſited this iſland, ſay, that the hills are ſteep, covered with wood, and difficult of acceſs, and that the vallies exhibit a few irregular plantations of cocoa-nuts. The original natives, ſtated at about 7000 in number, occupy the hills in the interior of the iſland; and they are generally at war with the Arabian interlopers, who have eſtabliſhed themſelves by conqueſt cueſt on the ſea-coaſt, and are ſaid to be in number about 3000. Theſe latter are deſcribed as poor miſerable beings, who, not being able to carry on any extenſive cultivation, on account of being expoſed to the depredations of the mountaineer natives, ſubſiſt chiefly by ſupplying the Indian ſhips which touch there for refreſhment, with a few cattle and tropical fruits. Of their ability to accommodate ſtrangers on ſhore, thoſe who have touched at the iſland ſpeak in very degrading terms, as their huts or hovels are filthy and badly conſtructed. The huts of the poorer people are formed of twigs, interwoven with and covered by a ſtrong coat of graſs, and the roof is protected by a kind of mat, made of the leaves of the cocoa trees. People of ſuperior rank have houſes built of ſtone, cemented with tempered clay. The king, as he is called, or chief of the iſland, reſides about nine miles from the town of Joanna, which contains about 200 houſes, many of which are built of ſtone and occupied by perſons of principal diſtinction in the iſland: but they are low and incommodious: the palace of the king excepted, which is high and ſpacious. This chief poſſeſſes an unlimited power over his ſubjects, in all concerns, religious as well as temporal: he ſeldom viſits the town except on the arrival of European veſſels, when he is accompanied by a numerous equipage, and received with great attention and reſpect by the commanders of the ſhips. Every captain finds it his intereſt to treat him in this manner, as his permiſſion muſt be obtained before any traffic can be opened with the inhabitants; and with this view he receives a ſmall preſent of European manufactures. The principal domeſtic animals in the iſland are cattle, ſheep, and hogs; there are ſeveral ſpecies of fowl, and different kinds of game. The ſea abounds with a variety of excellent fiſh; and particularly with a ſort of electrical fiſh, ſeven inches long, 2½ inches broad, with a long projecting mouth, a head of a dark brown colour, the belly of ſea-green, the ſides yellow, and the fins and tail of a ſandy-green; the body interſperſed with red, green, and white ſpots; the eyes large, and the iris red, having its outer edges tinged with yellow. The ſea-coaſt is wholly compoſed of coral rocks, which are in many places hollowed by the ſea; and in thoſe cavities ſeveral of the electrical fiſhes were found. See a deſcription and drawing in the Phil. Tranſ. vol. lxxvi. p. 352. The natives of the iſland are, in general, tall, robuſt, and well-made; the women are inferior to the men; they have all long black hair, piercing eyes, and colour between olive and black. People of lower rank have no other covering beſides a piece of cloth tied round their loins, and on their heads a cap of any ſtuff which they can procure. Thoſe of higher rank wear a ſhirt with large ſleeves, hanging down upon a pair of drawers and covering a ſtuff waiſtcoat; thoſe of ſtill higher orders wear turbans; and they generally have large knives attached to a belt, which paſſes round their middle. The women are clothed in a kind of jacket and petticoat, with a looſe robe, and when they go abroad, they cover the face with a veil: they are very attentive to ornaments for their legs, arms, and ears. Their children, both male and female, are ſuffered to be naked till the age of ſeven or eight years. The inhabitants in general are commended for their ſimplicity, obliging diſpoſition, and hoſpitality. Polygamy is allowed; ſo that each perſon has two or three wives, and as many concubines as he can maintain. S. lat. 12° 13′. E. long. 44° 15′.

JOAO, St., a ſmall iſland near the coaſt of Brazil. S. lat. ° 22′. W. long. 46° 26′.

Joao *Fuſtado*, a town of Brazil, in the iſland of Marajo; 20 miles S.S.W. of Engenho-real.

Joao *de Fundo, St.*, a town of Portugal, in Eſtremadura; 32 miles N.E. of Thomar.

Joao *de Furtado, St.*, a town of Brazil, in the government of Para, on the Guanapu; 75 miles S.W. of Para.

Joao *Martino*, a ſmall iſland in the Indian ſea. S. lat 10° 8′. W. long 42° 54′.

Joao *de Monte, St.*, a town of Portugal, in the province of Beira; 12 miles W.S.W. of St. Viſeu.

Joao *de Nova*, a ſmall iſland in the channel of Mozambique. S. lat. 16° 58′. E. long. 40° 34′.—Alſo, two ſmall iſlands in the Indian ſea. S. lat. 9° 30′. E. long. 49° 14′.

Joao *de Peſqueira, St.*, a town of Portugal, in the province of Beira, on the Duero; containing two pariſh churches, and about 600 inhabitants; near it is a cataract on the Duero, which prevents the navigation of this river; 21 miles E.S.E. of Lamego. N. lat. 41° 1′. W. long. 7° 1′.

Joao *de Po, St.*, a town of Portugal, in the province of Beira; ſeven miles N.E. of Braganza Nova.

Joao *del Rey, St.* a town of Brazil, in the government of Menas Geraes; 80 miles S.W. of Villarica.

JOAR, a town of Africa, in the kingdom of Burſali, ſurrounded with paliſades as a defence from wild beaſts; 10 miles S. of Kower.

JOARTAM, a town and kingdom of the iſland of Java, in the N.E. part of the iſland.

JOARYA, a town of Bengal; 55 miles S. of Iſlamabad.

JOB, or *the Book of Job*, a canonical book of the Old Teſtament, containing the narrative of a ſeries of misfortunes, which happened to a man, whoſe name was Job, an inhabitant of the land of Uz, ſuppoſed to be that part of Arabia Petræa which is called Idumæa, as a trial of his virtue and patience; together with the conferences he had with his cruel friends on the ſubject of his misfortunes; and the manner in which he was reſtored to eaſe and happineſs. This book is filled with thoſe noble, bold, and figurative expreſſions, which conſtitute the very ſoul of poetry.

Many of the Jewiſh rabbins pretend that this relation is altogether a fiction; others think it a ſimple narrative of a matter of fact, juſt as it happened; while a third claſs of critics own the ground-work of the ſtory to be true, but that it is wrote in a poetical ſtrain, and decorated with peculiar circumſtances, to render the narration more profitable and entertaining. Others, again, ſuppoſe that, like ſome of our Saviour's parables, it is a fabulous narration deſigned to convey important and uſeful ſentiments reſpecting the ſuperintending providence of God, in a manner more forcible and impreſſive than in the form of abſtract rules and precepts.

See an expreſs diſſertation on the book of Job, in the biſhop of Glouceſter's "Divine Legation of Moſes," vol. ii. The biſhop is of opinion that this book is a dramatic poem written by Ezra, ſome time between the return of the Jews from the captivity of Babylon, and their thorough ſettlement in their own country, and adapted to the circumſtances of theſe times, by being made allegorical as well as dramatic: thus, Job, who is ſuppoſed to have been a real perſon, that lived a generation or two before Moſes, is deſigned to perſonate the Jewiſh people; his three friends the three great enemies of the Jews, Sanballat, Tobiah, and Geſhem, who upon their return from captivity, vexed and obſtructed them in rebuilding their city and temple; Job's wife was intended by the poet to repreſent the idolatrous wives which many of the Jews had taken, contrary to the law, and for which they are reproved by the prophet Nehemiah.

In order to prove the compoſition of this book to be dramatic, the learned biſhop alleges its ſtyle, which, excepting the introduction and concluſion, is in meaſure; its ſentiments, which are delivered not only in verſe but in a kind of poetry, animated by all the ſublimity of figures and floridneſs of deſcription, whence he concludes the whole to be a work of imagination; and the whole form of its compoſition. The biſhop's proof that the book of Job is no older than the time of Ezra, reſts chiefly upon theſe two points, *viz.* his notion of an equal providence under the Moſaic diſpenſation, and that of the book's being an allegorical dramatic poem. The former point, which he conceives to have been the grand queſtion diſcuſſed in this book, could be no queſtion, in his opinion, any where out of the land of Judea; nor there neither, in any period of the Jewiſh nation, either before or after that in which he places it. The queſtion he ſuppoſes to be this, whether God adminiſters his government over men here with an equal providence, ſo as that the good are always proſperous, and the bad unhappy; or whether, on the contrary, there be not ſuch apparent inequalities, as that proſperity and adverſity often happen indifferently to good and bad. Job, ſays our author, maintains the latter part of the queſtion, and his three friends the former. They argue theſe points through the whole diſpute, and each party firmly adheres to his firſt opinion. After giving ſome account of the diſtreſſed condition of the Jews upon their return from the captivity, he thus proceeds: "Could any thing be conceived more ſeaſonable and neceſſary at this time than ſuch a work as the book of Job? In which, on a traditional ſtory of great fame and reputation all over the Eaſt, a good man was repreſented as afflicted for the trial of his virtue, and rewarded for his afflictions; and in which their doubts about God's providence were piouſly reſolved into his almighty power. For to quiet all their anxieties, and to comfort them under their preſent diſtreſſes was, I ſuppoſe, the reaſon of one of their prophets compoſing the book of Job at this very period. But if ſuch was the end of writing this poetic ſtory, we cannot but ſuppoſe every thing in it would be fitted to the circumſtances of thoſe times. But this could not be done without making the poem *allegorical* as well as dramatic; that is, repreſenting the real perſons of that age under the perſons of the drama." That this poem is wholly allegorical the biſhop argues from the divers circumſtances that are added to each character, which can, by no means, belong to the perſons repreſenting; and therefore others were meant under thoſe characters, as the perſons repreſented. This ſtatement he endeavours to juſtify and confirm by examining each character, in its reference to the perſon repreſented, beginning with Job, who repreſents the Jewiſh people; and proceeding to ſhew how his wife pourtrayed the idolatrous wives of the Jews, and how his three friends repreſented the three capital enemies of the Jews, above-mentioned.

The next perſon in this allegorical drama is the devil himſelf, or Satan, the author and contriver of all the miſchief. This aſſault of Satan upon Job, ſays the biſhop, was that which, as the prophet Zachariah tells us, (chap. ii. ver. 13. chap. iii. ver. 1, &c.) he made, at this time, on the people; "The only difference is, that, in the prophecy, Joſhua the high prieſt ſtands for the people, and in this poem, Job; in all the reſt, the identity is ſo ſtrongly ſupported, that this ſingle circumſtance is alone ſufficient to confirm the truth of our whole repreſentation."—"The finding of Satan in the ſcene is a certain proof (ſays our author) that the work was compoſed in the age we aſſign to it. This evil being was little known to the people till about this time." The laſt perſon in this allegorical drama is Elihu; and Elihu, according to the biſhop's ſtatement, was Ezra, or the ſacred writer himſelf. Such are the general outlines of the learned biſhop's hypotheſis, in which, it muſt be allowed, he has manifeſted a conſiderable degree of ingenuity, and, as we conceive, no ſmall diſplay of fancy. This hypotheſis has been examined, and in our judgment, ſatisfactorily refuted in Mr. Peters' "Critical Diſſertation on the Book of Job."

Le Clerc ſuppoſes that the book of Job, which, in his opinion, was a hiſtory treated in a poetical manner, or a hiſtory treated in the form of a parable, was written after the Jews were carried into Babylon, and urges, in proof of this, the frequent chaldaiſms that occur in it.

The learned Grotius apprehends that this book contains a true hiſtory, treated in a poetical manner; and he was probably led to adopt this opinion from adverting to the ſupernatural and ſurpriſing incidents that occur in it; ſuch as that of the ſons of God preſenting themſelves before Jehovah, and the divine interpoſition at the concluſion. But as he ſuppoſed the book to be written at the diſtance of about a thouſand years from the date of the ſubject of which it treats, he could ſcarcely imagine that there was much of true hiſtory in it. Would not a conſiderable difficulty in ſettling the time, when this book was written, be obviated, by ſuppoſing that the introductory part in the two firſt chapters, in which Satan makes ſo conſpicuous a figure, (and perhaps the concluſion,) were written after the Babyloniſh captivity, by ſome writer, Ezra or another perſon; for, as biſhop Warburton allows, Satan became more known among the Jews after their return from Babylon? Grotius farther ſuppoſes, that the events recorded in this poetical hiſtory happened in Arabia, whilſt the Hebrews wandered in the deſert; and that the writer, who was a Hebrew, lived before the time of Ezekiel, as he infers from that paſſage in his prophecy, where Job is mentioned; but after David and Solomon, from whoſe writings, as he conceives, ſome ſentences and forms of ſpeech are transferred hither; and that it was written for the uſe of the Edomites, tranſported to Babylon, to confirm them in the worſhip of the true God, and to teach them patience in adverſity.

The learned writer whoſe ſentiments we are now detailing, acknowledges that there is no mention in this book of any law but ſuch as was traditional; nor of any point of hiſtory, beſides thoſe of the more ancient times, *viz.* before the giving of the Moſaic law; that the length of Job's life which extended to 200 years, agrees with thoſe times; and that though the writer is unknown, it appears credible from a paſſage in Ezekiel, that he lived before the time of that prophet. David and Solomon might have borrowed forms of ſpeech from the book of Job; which is no leſs probable than the ſuppoſition of Grotius already mentioned; and if the book was written before the time of Ezekiel, the author could not have borrowed from Daniel, Ezra, and the Chaldee paraphraſts, as Grotius ſeems to intimate.

Schultens aſcribes the poetical, or dialogue part of this book, the ſtyle of which, he ſays, has all the marks of the moſt venerable and remote antiquity, to Job himſelf; the reſt he ſuppoſes to be the work of ſome Hebrew collector. As for Le Clerc's chaldaiſms, ſuch as the termination *in* for *im*, in the plural, he ſays they are true Hebrew and Arabic, of the moſt ancient ſtamp. See alſo Grey's Job, p. 12. of the preface. Moſt of the Jewiſh doctors believe that Moſes was the writer of this book; and M. Huet, with whom profeſſor Michaelis concurs, ſuppoſes that it was written by Moſes in his exile in the land of Midian; where he reſided 40 years. Some have ſuppoſed that it was either written by him, or tranſlated by him from the original Syriac, or Arabic, and that it was deſigned to prepare the Iſraelites for their exodus from Egypt, and the hardſhips of their future peregrination. All thoſe learned men, who ſuppoſe this book to have been written by Moſes, or Elihu, as Lightfoot imagines, or ſome perſon near the time of Job, muſt of courſe be perſuaded that there is nothing in the ſtyle, which is not very conſiſtent with this remote antiquity; and that the phraſes which others take for imitations of paſſages in the Pſalms or Proverbs, Daniel or Ezra, are rather originals to theſe, and that theſe laſt are really the imitations. It is certain, whoever was the author of this book, that the ſtyle has a mixture of the Arabic. And thoſe who have made the happieſt conjectures for the ſolution of difficulties and the explication of particular paſſages, have been more indebted to the Arabic than to the Chaldee; ſo that the language in which it was written might have been ſpoken in Arabia in the days of Job. And this is the more probable, if the ſons of Abraham by Keturah (from whom Job himſelf is ſuppoſed to be deſcended) were thoſe who peopled this part of the world; for then, without doubt, they carried the language of Abraham along with them.

Mr. Peters concurs in opinion with thoſe who believe this book to be the oldeſt in the world; that it was written, probably, by Job himſelf; and that it contains, in the main, a true hiſtory.

The eminently learned and ingenious critic, biſhop Lowth, has devoted three lectures of his "Prælectiones, &c." to the examination of the book of Job. The ſcene of this book is laid in Idumæa; the hiſtory of an inhabitant of that country is the baſis of the narrative; the characters who ſpeak are Idumæans, or at leaſt Arabians of the adjacent country, all originally of the race of Abraham. The language is pure Hebrew, although the author appears to be an Idumæan; for it is not improbable that all the poſterity of Abraham, Iſraelites, Idumæans, and Arabians, whether of the family of Keturah or Iſhmael, ſpoke for a conſiderable time one common language. Our learned author, diſcarding the ſentiments of thoſe who aſcribe this book to Elihu, proceeds to examine the claims of Moſes, to whom it has been more generally aſcribed. This hypotheſis he repreſents as very futile, ſince it is impoſſible to trace, throughout the whole book, the ſlighteſt alluſion to the manners, cuſtoms, ceremonies, or hiſtory of the Iſraelites. The ſtyle of Job appears, alſo, to be materially different from the poetical ſtyle of Moſes; being much more compact, conciſe, or condenſed, more accurate in the poetical conformation of the ſentences. He therefore avows himſelf inclined to favour the opinion of thoſe, who ſuppoſe Job himſelf, or ſome contemporary, to be the author of this poem, which is the moſt ancient of all the ſacred books, as is manifeſt from the ſubject, the language, the general character, and even from the obſcurity of the work. The ſtyle of the poem favours ſo much of the antique, that in the judgment of the learned prelate, whoever would ſuppoſe it written after the Babyloniſh captivity would fall little ſhort of the error of Hardouin, who aſcribed the golden verſes of Virgil, Horace, &c. to the "iron age" of monkiſh pedantry and ignorance.

As to the time in which Job lived, the length of his life evinces that he was before Moſes, and probably contemporary with the patriarchs. That he lived at a period prior to the promulgation of the law is very probable, from the nature of the ſacrifice which he inſtitutes, conformably to the command of God, namely, ſeven oxen and ſeven rams; a reſpect being paid in theſe countries, and at that period, to that number, from the traditional accounts which were ſtill preſerved among them of the ſeven days of creation. The poem is founded in fact, as far as concerns the general ſubject of the narrative; though the whole dialogue, and probably ſome other parts, have partaken largely of the embelliſhments of poetry: but this has not by any means extended ſo far as to convert the whole into an allegory. The exordium and concluſion, indeed, are diſtinct from the poem itſelf, and ſtand in the place of an argument or illuſtration; but our author conceives, that they are coëval with the poetical part, and the work of the ſame author, becauſe they are indiſpenſibly neceſſary to the unravelling of the plot, which is not developed in the body of the poem. Michaelis, who conſiders the ſubject of the poem as altogether fabulous, and who apprehends that it is more inſtructive as a fable than it poſſibly could be if it were a true hiſtory, cannot but regard the exordium, in which Satan appears as the accuſer of Job, rather in the light of a fable than of a true narrative. It is ſurely incredible that ſuch a converſation ever took place between the Almighty and Satan, who is ſuppoſed to return with *news* from the terreſtrial regions. There are, it is true, ſays the learned prelate, phraſes extant in the exordium, in which ſome critics have pretended to diſcover the hand of a later writer; but he is not convinced by the arguments which they produce. The principal object held forth to our contemplation in this production is the example of a good man, eminent for his piety, and of approved integrity, ſuddenly precipitated from the very ſummit of proſperity into the loweſt depths of miſery and ruin: who having been firſt bereaved of his wealth, his poſſeſſions, and his children, is afterwards afflicted with the moſt excruciating anguiſh of a loathſome diſeaſe, which entirely covers his body. He ſuſtains all, however, with the mildeſt ſubmiſſion, and the moſt complete reſignation to the will of Providence. "In all this," ſays the hiſtorian, "Job ſinned not, nor charged God fooliſhly." And after the ſecond trial, "In all this did not Job ſin with his lips." The author of the hiſtory remarks upon this circumſtance a ſecond time, in order to excite the obſervation of the reader, and to render him more attentive to what follows, which properly conſtitutes the true ſubject of the poem: namely, the conduct of Job with reſpect to his reverence for the Almighty, and the changes which accumulating miſery might produce in his temper and behaviour. Accordingly we find that another ſtill more exquiſite trial of his patience yet awaits him, and which indeed, as the writer ſeems to intimate, he ſcarcely appears to have ſuſtained with equal firmneſs, namely, the unjuſt ſuſpicions, the bitter reproaches, and the violent altercations of his friends, who had viſited him on the pretence of affording conſolation. Here commences the plot or action of the poem: for when, after a long ſilence of all parties, the grief of Job breaks forth into paſſionate exclamations, and a vehement execration on the day of his birth; the minds of his friends are ſuddenly exaſperated, their intentions are changed, and their conſolation, if indeed they originally intended any, is converted into contumely and reproaches. The firſt of theſe three ſingular comforters reproves his impatience; calls in queſtion his integrity, by indirectly inſinuating that God does not inflict ſuch puniſhments upon the righteous; and finally admoniſhes him, that the chaſtiſement of God is not to be deſpiſed. The next of them, not leſs intemperate in his reproofs, takes it for granted, that the children of Job had only received the reward due to their offences; and with regard to himſelf, intimates, that if he be innocent, and will apply with proper humility to the divine mercy, he may be reſtored. The third upbraids him with arrogance, with vanity, and even with falſehood, becauſe he has preſumed to defend himſelf againſt the unjuſt accuſations of his companions; and exhorts him to a ſounder mode of reaſoning and a more holy life. They all, with a manifeſt, though indirect alluſion to Job, diſcourſe very copiouſly concerning the divine judgments which are always openly diſplayed againſt the wicked, and of the certain deſtruction of hypocritical pretenders to virtue and religion. In reply to this, Job enumerates his ſufferings, and complains bitterly of the inhumanity of his friends, and of the ſeverity which he has experienced from the hand of God; he calls to witneſs both God and man, that he is unjuſtly oppreſſed; he intimates, that he is weak in compariſon with God, that the contention is conſequently unequal, and that be his cauſe ever ſo righteous he cannot hope to prevail. He expoſtulates with God himſelf ſtill more vehemently, and with greater freedom, affirming, that he does not diſcriminate characters, but equally afflicts the juſt and the unjuſt. The expoſtulations of Job ſerve only to irritate ſtill more the reſentment of his pretended friends; they reproach him in ſeverer terms with pride, impiety, paſſion, and madneſs: they repeat the ſame arguments reſpecting the juſtice of God, the puniſhment of the wicked, and their certain deſtruction after a ſhort period of apparent proſperity. This ſentiment they confidently pronounce to be confirmed both by their experience and by that of their fathers; and they maliciouſly exaggerate the ungrateful topic, by the moſt ſplendid imagery and the moſt forcible language. On the part of Job, the general ſcope of the argument is much the ſame as before, but the expreſſion is conſiderably heightened; it conſiſts of appeals to the Almighty, aſſeverations of his own innocence, earneſt expoſtulations, complaints of the cruelty of his friends, melancholy reflections on the vanity of human life, and upon his own ſevere misfortunes, ending in grief and deſperation: he affirms, however, that he places his ultimate hope and confidence in God; and the more vehemently his adverſaries urge, that the wicked only are objects of the divine wrath, and obnoxious to puniſhment, ſo much the more reſolutely does Job aſſert their perpetual impunity, proſperity, and happineſs even to the end of their exiſtence. The firſt of his opponents, Eliphaz, incenſed by this aſſertion, deſcends directly to open crimination and contumely; he accuſes the moſt upright of men of the moſt atrocious crimes, of injuſtice, rapine, and oppreſſion; inveighs againſt him as an impious pretender to virtue and religion, and with a kind of ſarcaſtic benevolence exhorts him to penitence. Vehemently affected with this reproof, Job, in a ſtill more animated and confident ſtrain, appeals to the tribunal of All-ſeeing Juſtice; and wiſhes it were only permitted him to plead his cauſe in the preſence of God himſelf. He complains ſtill more intemperately of the unequal treatment of Providence; exults in his own integrity, and then more tenaciouſly maintains his former opinion concerning the impunity of the wicked. To this another of the triumvirate, Bildad, replies, by a maſterly, though conciſe, diſſertation on the majeſty and ſanctity of the Divine Being, indirectly rebuking the preſumption of Job, who has dared to queſtion his decrees. In reply to Bildad, Job demonſtrates himſelf no leſs expert at wielding the weapons of ſatire and ridicule, than thoſe of reaſon and argument; and reverting to a more ſerious tone, he diſplays the infinite power and wiſdom of God more copiouſly, and more poetically than the former ſpeaker. The third of the friends making no return, and the others remaining ſilent, Job at length opens the true ſentiments of his heart concerning the fate of the wicked; he allows that their proſperity is unſtable, and that they and their deſcendants ſhall at laſt experience on a ſudden, that God is the avenger of iniquity. In all this, however, he contends that the divine counſels do not admit of human inveſtigation; but that the chief wiſdom of man conſiſts in the fear of God. He beautifully deſcants upon his former proſperity; and exhibits a ſtriking contraſt between it and his preſent affliction and debaſement. Laſtly, in anſwer to the crimination of Eliphaz, and the implications of the others, he relates the principal tranſactions of his paſt life; he aſſerts his integrity as diſplayed in all the duties of life, and in the ſight of God and man; and again appeals to the juſtice and omniſcience of God in atteſtation of his veracity.

When Job's three friends have ceaſed to diſpute with Job, "becauſe he ſeemeth juſt in his own eyes," that is, becauſe he has uniformly contended, that there was no wickedneſs in himſelf which could call down the heavy vengeance of God; Elihu comes forward juſtly offended with both parties; with Job, becauſe "he juſtified himſelf in preference to God," that is, becauſe he defended ſo vehemently the juſtice of his own cauſe, that he ſeemed in ſome meaſure to arraign the juſtice of God; againſt the three friends, becauſe, "though they were unable to anſwer Job, they ceaſed not to condemn him," that is, they concluded in their own minds that Job was impious and wicked, while, nevertheleſs, they had nothing ſpecific to object againſt his aſſertions of his own innocence, or upon which they might ſafely ground their accuſation.

The conduct of Elihu evidently correſponds with this ſtate of the controverſy: he profeſſes, after a ſlight prefatory mention of himſelf, to reaſon with Job, unbiaſſed equally by favour or reſentment. He therefore reproves Job from his own mouth, becauſe he had attributed too much to himſelf; becauſe he had affirmed himſelf to be altogether free from guilt and depravity; becauſe he had preſumed to contend with God, and had not ſcrupled to inſinuate that the Deity was hoſtile to him. He aſſerts, that it is not neceſſary for God to explain and develope his counſels to men; that he nevertheleſs takes many occaſions of admoniſhing them, not only by viſions and revelations, but even by the viſitations of his Providence, by ſending calamities and diſeaſes upon them, to repreſs their arrogance and reform their obduracy. He next rebukes Job, becauſe he had pronounced himſelf upright, and affirmed that God had acted inimically, if not unjuſtly towards him, which he proves to be no leſs improper than indecent. In the third place, he objects to Job, that from the miſeries of the good, and the proſperity of the wicked, he has falſely and perverſely concluded that there was no advantage to be derived from the practice of virtue. On the contrary he affirms, that when the afflictions of the juſt continue, it is becauſe they do not place a proper confidence in God, aſk relief at his hands, patiently expect it, nor demean themſelves before him with becoming humility and ſubmiſſion. This obſervation alone, he adds very properly, is at once a ſufficient reproof of the contumacy of Job, and a full refutation of the unjuſt ſuſpicions of his friends. Laſtly, he explains the purpoſes of the Deity in chaſtening men, which are in general to prove and to amend them, to repreſs their arrogance, to afford him an opportunity of exemplifying his juſtice upon the obſtinate and rebellious, and of ſhewing favour to the humble and obedient. He ſuppoſes God to have acted in this manner towards Job; on that account he exhorts him to humble himſelf before his righteous Judge, to beware of appearing obſtinate or contumacious in his ſight, and of relapſing into a repetition of his ſin. He intreats him, from the contemplation of the divine power and majeſty, to endeavour to retain a proper reverence for the Almighty. To theſe frequently intermitted and often repeated admonitions of Elihu, Job makes no return.

The ſpeech of Elihu is followed by the addreſs of God himſelf: at the cloſe of which, Job humbly ſubmits to the will of Providence, acknowledges his own ignorance and imbecility, and "repents in duſt and aſhes."

On a due conſideration of all theſe circumſtances, the principal object of the poem ſeems to be this third and laſt trial of Job, from the injuſtice and unkindneſs of his accuſing friends. The conſequence of which is, in the firſt place, the anger, indignation, and contumacy of Job, and afterwards his compoſure, ſubmiſſion, and penitence. The deſign of the poem is, therefore, to teach men, that having a due reſpect to the corruption, infirmity, and ignorance of human nature, as well as to the infinite wiſdom and majeſty of God, they are to reject all confidence in their own ſtrength, in their own righteouſneſs, and to preſerve on all occaſions an unwavering and unſullied faith, and to ſubmit with becoming reverence to his decrees.

The whole hiſtory detailed in the book of Job, taken together, contains an example of patience, together with its reward.

Our author next proceeds to inquire whether the poem of Job be poſſeſſed of the peculiar properties of the Greek drama: and after conſidering a variety of circumſtances, he affirms without heſitation, that the poem of Job contains no plot or action whatever, not even of the moſt ſimple kind: it uniformly exhibits one conſtant ſtate of things, without the ſmalleſt change of feature from the beginning to the end; and contains nearly a repreſentation of thoſe manners, paſſions, and ſentiments, which might actually be expected in ſuch a ſituation. The very nature of the ſubject excludes even the poſſibility of a plot or action. Upon the whole, our author concludes, that the poem of Job cannot properly be brought into compariſon with any of the Greek tragedies. But though it has no claim to the merit of a perfect drama, our author does not wiſh to derogate from its merits. That cenſure will rather apply to thoſe who, by criticiſing it according to foreign and improper rules, would make that compoſition appear lame and imperfect, which, on the contrary, is in its kind moſt beautiful and perfect. If indeed the extreme antiquity of this poem, the obſcurity and the difficulty that neceſſarily enſue from that circumſtance be conſidered; and if allowance be made for the total want of plot and action, we ſhall have cauſe to wonder at the elegance and intereſt which we find in its form, conduct, and economy. The arrangement is perfectly regular, and every part is admirably adapted to its end and deſign. The antiquary or the critic, who has been at the pains to trace the hiſtory of the Grecian drama from its firſt weak and imperfect efforts, and has carefully obſerved its tardy progreſs to perfection, will ſcarcely, without aſtoniſhment, contemplate a poem produced ſo many ages before, ſo elegant in its deſign, ſo regular in its ſtructure, ſo animated, ſo affecting, ſo near to the true dramatic model: while, on the contrary, the united wiſdom of Greece, after ages of ſtudy, was not able to produce any thing approaching to perfection in this walk of poetry before the time of Æſchylus. But however this be—whatever rank may be aſſigned to Job, in a compariſon with the poets of Greece, to whom we muſt at leaſt allow the merit of art and method; amongſt the Hebrews, it muſt certainly be allowed, in this reſpect, to be unrivalled. It is of little conſequence whether it be eſteemed a didactic or an ethic, a pathetic or dramatic poem; only let it be aſſigned a diſtinct and conſpicuous ſtation in the higheſt rank of the Hebrew poetry.

The moſt ſplendid examples, ſays our author, of every beauty and elegance of ſentiment, of imagery, and of diction, meet the eye of the attentive reader in every part of the poem. Let it ſuffice to ſay, that the dignity of the ſtyle is anſwerable to that of the ſubject; its force and energy to the greatneſs of thoſe paſſions which it deſcribes: and as this production excels all the other remains of the Hebrew poetry in economy and arrangement, ſo it yields to none in ſublimity of ſtyle, and in every grace and excellence of compoſition. Among the principal of theſe may be accounted the accurate and perfectly poetical conformation of the ſentences, which is indeed generally moſt obſervable in the moſt ancient of the poetical compoſitions of the Hebrews. Here, however, as is natural and proper in a poem of ſo great length and ſublimity, the writer's ſkill is diſplayed in the proper adjuſtment of the period, and in the accurate diſtribution of the members, rather than in the antitheſis of words, or in any laboured adaptation of the paralleliſms.

"The poetry of the book of Job," ſays Dr. Blair, "is not only equal to that of any other of the ſacred writings, but is ſuperior to them all, except thoſe of Iſaiah alone. As Iſaiah is the moſt ſublime, David the moſt pleaſing and tender, ſo Job is the moſt deſcriptive of all the inſpired poets. A peculiar glow of fancy, and ſtrength of deſcription, characterize this author. No writer whatever abounds ſo much in metaphors. He may be ſaid, not to deſcribe, but to render viſible, whatever he treats of. Inſtances every where occur; particularly in the 18th and 20th chapters, in which he paints the condition of the wicked." Schultens and Le Clerc's Præf. ad Comment. in Job. Lowth de Sac. Poeſ. Prælectiones 32—34. Gregory's Tranſ. with Michaelis's Notes. Peter's Crit. Diſſert. Dupin. Heath, Scott, and Grey on Job. Blair's Lect. vol. iii. Dr. Stock, biſhop of Killala, in his tranſlation and notes, concurs with thoſe who refer this book to a late period; not earlier than the Babyloniſh captivity.

Job's *Tears*, in *Botany*. See Coix.

Job, *St.*, in *Geography*, a town of Hungary, near which are a celebrated abbey, and an old caſtle; 24 miles S.E. of Debreczin.

JOBAK, a town of Hindooſtan, in the Gurry Mundelah; 30 miles S. of Gurrah.

JOBBER, a perſon who undertakes jobs, or ſmall pieces of work.

In ſome ſtatutes, jobber is uſed for a perſon who buys and ſells cattle for others. See Broker.

JOBBING, Stock, denotes the practice of trafficking in the public funds, or of buying and ſelling ſtock, with a view to its riſe or fall. The term is commonly applied to the illegal practice of buying and ſelling ſtock for time, or of accounting for the differences in the riſe or fall of any particular ſtock for a ſtipulated time; whether the buyer or ſeller be poſſeſſed of any ſuch ſtock or not. See *Stock* Brokers.

Jobbing, in *Rural Economy*, a term uſed by farmers for a petty kind of buying and ſelling, or dealing in cattle, or any other ſort of farming-ſtock. Men of this kind are alſo frequently employed by the larger dealers. It has been obſerved, that "if a midland farmer goes to a fair, he is aſhamed to return without having 'done ſome buſineſs:' he muſt either buy or ſell, or he loſes his credit as a market man. Hence, probably, the quantity of buſineſs done at the midland fairs, compared with thoſe of other diſtricts, where one-third, or perhaps half, the ſtock is frequently unſold, is very conſiderable, while here, the whole fair may be ſaid to be generally transferred."

JOBENT Nails. See Nails.

JOBERT, Lewis, in *Biography*, a French Jeſuit, diſtinguiſhed as well by his antiquarian knowledge, as by his pulpit talents and eloquence, was born at Paris in the year 1637. He was a teacher of the ſeveral branches of polite literature, and performed the duties of his ſtation with diſtinguiſhed ability. He died in 1719, leaving behind him many works, but the moſt important was an elaborate treatiſe on "Medals," which was publiſhed in two volumes, 12mo., in the year 1692. This work poſſeſſes great merit, and met with a very favourable reception. It has gone through many editions at Paris, Amſterdam, Leipſic, and Nuremburg. The moſt correct is ſaid to be that of Paris in 1739, with additions by M. Joſeph Bimard de la Baſtie. Moreri.

JOBIE, in *Geography*, an iſland in the Pacific ocean, at the entrance of a great bay on the coaſt of New Guinea; 110 miles long from E. to W., and from 6 to 20 broad. S. lat. 1° 36′ to 2°. E. long. 135° 50′ to 137° 36′.

JOCALLA, a town of Peru, in the dioceſe of La Paz; 9 miles N. of Potoſi.

JOCHER, Christian Gottlieb, in *Biography*, doctor of theology, public profeſſor of hiſtory at Leipſic, and librarian to the academy, was born in that city in 1694. Having received the elements of an excellent education at different ſchools, he devoted himſelf to the ſtudy of theology, and obtained his degrees at Leipſic. He ſoon became a diſciple of Leibnitz and Wolf, and was the firſt perſon who gave lectures on the ſyſtem of Wolf. He ſoon attracted a numerous concourſe of pupils, and was moſt aſſiduous in his inſtructions. To render his lectures as uſeful as poſſible, he ſtudied inceſſantly, ſo as to injure his health. In 1720 his father died in diſtreſſed circumſtances, which obliged the ſon to exert all his powers for his ſupport: he became the editor of the German "Acta Eruditorum," which he conducted with great ſpirit till the year 1739. In 1730 he was appointed profeſſor of philoſophy, then of hiſtory, and in 1742 he obtained the office of librarian to the univerſity. He died in 1758, much eſteemed as a man of letters and a good teacher. He poſſeſſed an extenſive knowledge in the various branches of literature and ſcience, and was acquainted with the beſt writers on the ſeveral ſubjects. His principal work was "A Compendious Dictionary of learned Men," arranged alphabetically. This went through four editions in the author's life time, of which the laſt was extended to four volumes quarto. Two ſupplementary volumes, which go as far as I, have been ſince publiſhed by Adelung, entitled "A Continuation of, and Supplement to Jocher's General Dictionary of learned Men." Gen. Biog.

JOCKEY, in the management of horſes; the perſon who trims up, and rides about horſes for ſale.

JOCKGRIM, in *Geography*, a town of France, in the department of the Lower Rhine, ſituated on an eminence near the Rhine; 9 miles S.E. of Landau.

JOCKLET, or Yocklet, a term uſed in ſome parts of Kent for a little farm which requires but one yoke of oxen to till it.

JOCKMOCKI, in *Geography*, a town of Sweden, in the lapmark of Lulea; 90 miles N.N.W. of Lulea.

JOCKO, in *Zoology*. See Simia *Satyrus*.

JOCRONS, in *Geography*, a town of Hindooſtan, in Myſore; 20 miles N.N.E. of Chitteldroog.

JODELLE, Stephen, in *Biography*, an early French poet, was born at Paris in 1532, of a family of ſome rank. He was a man of various talents, ſkilled in the ancient languages, and converſant in the arts of painting, ſculpture, and architecture, as well as dextrous in the uſe of arms; but his chief excellence was in poetry. He is ſaid to have made five hundred Latin verſes in one night. He was the firſt perſon who introduced tragedy and comedy in the ancient form into French poetry. His Cleopatra is the earlieſt of French tragedies, and was acted with great applauſe before Henry II. and all the great men of France. It is ſimple in its plan, and provided with a perpetual chorus in imitation of the ancient ſtyle. The comedies of this writer are ſaid to be ſuperior to his tragedies; he was undoubtedly popular in his day, but was, notwithſtanding, ſuffered to fall into indigence, to which his careleſsneſs and love of pleaſure contributed. He died in 1573, at the age of 41, and upon his death-bed he dictated a ſonnet to Charles IX., containing ſevere reproaches for deſerting him in neceſſity. His works have been publiſhed collectively at Paris and Lyons.

JODO, in *Geography*, a town of Japan, in the iſland of Niphon; 5 miles S. of Meaco.

JODOIGNE, a town of France, in the department of Dyle, and chief place of a canton, in the diſtrict of Nevelles: the place contains 2012, and the canton 14,434, inhabitants, on a territory of 165 kiliometres, in 28 communes.

JOEL, or *the Prophecy of Joel*, a canonical book of the Old Teſtament. Joel was the ſon of Pethuel, and the ſecond of the twelve leſſer prophets. The ſtyle of this prophet is elegant, perſpicuous, copious, and fluent; he is alſo ſublime, animated, and energetic. In the 1ſt and 2d chapters he diſplays the full force of the prophetic poetry, and ſhews how naturally it inclines to the uſe of metaphors, allegories, and compariſons. Nor is the connection of the matter leſs clear and eminent than the complexion of the ſtyle. But after allowing him perſpicuity both in language and arrangement, it cannot be denied, that there is ſometimes great obſcurity in his ſubject, and particularly in the latter part of his prophecy. About the beginning of the laſt century, Herman Von der Handt, the Hardouin of Germany, attempted to reduce Joel's allegories, as he calls them, to Iambic verſe. Joel upbraids the Iſraelites for their idolatry, and foretels the calamities they ſhould ſuffer as the puniſhment of that ſin: but he endeavours to ſupport them with the comfort that their miſeries ſhould have an end upon their reformation and repentance. Some writers, inferring the order of time in which the minor prophets lived from the order in which they are placed in the Hebrew copies, conclude that Joel propheſied before Amos, who was contemporary with Uzziah, king of Judah. Archbiſhop Uſher makes this inference from Joel's foretelling that drought, chap. i. which Amos mentions as having happened, chap. iv. 7, 8, 9. If we conſider the main deſign of Joel's prophecy, we ſhall be apt to conclude, that it was uttered after the captivity of the ten tribes; for he directs his diſcourſe only to Judah, and ſpeaks diſtinctly of the ſacrifices and oblations that were daily made in the temple.

Biſhop Newcome, adopting the conjecture of Druſius, ſuppoſes that he lived under the long reign of Manaſſeh, and before his converſion; that is, ſome time from 697 to 660 B. C. Lowth's Com. Lowth's Præl. xxi. Newcome's Attempt towards an improved Verſion, &c. of the Twelve Minor Prophets.

JOGHIS, a ſect of heathen religious in the Eaſt Indies, who never marry, nor hold any thing in private property; but live on alms, and practiſe ſtrange ſeverities on themſelves.

They are ſubject to a general, who ſends them from one country to another to preach: they are, properly, a kind of penitent pilgrims; and are ſuppoſed to be a branch of the ancient Gymnoſophiſts.

They frequent, principally, ſuch places as are conſecrated by the devotion of the people, and pretend to live ſeveral days together without eating or drinking. After having gone through a courſe of diſcipline for a certain time, they look upon themſelves as impeccable, and privileged to do any thing; upon which they give a looſe to their paſſions, and run into all manner of debauchery.

JOGHY-COOPA, in *Geography*, a town of Aſſam; 90 miles N.W. of Gerghonge.

JOGUES, or Yoogs, certain ages, eras, or periods, of extraordinary length, in the chronology of the Hindoos. They are four in number; of which the following is an account, extracted from Halhed's Preface to the Code of Gentoo Laws, p. 36.

1. The *Suttee Jogue* (or age of purity), is ſaid to have laſted three million two hundred thouſand years; and they

hold that the life of man was extended in that age to one hundred thouſand years, and that his ſtature was twenty-one cubits.

2. The *Tirtah Jogue* (in which one-third of mankind was corrupted), they ſuppoſe to have conſiſted of two million four hundred thouſand years, and that men lived to the age of ten thouſand years.

3. The *Dwapaar Jogue* (in which half of the human race became depraved), endured one million ſix hundred thouſand years, and the life of man was then reduced to a thouſand years.

4. The *Collee Jogue* (in which all mankind are corrupted, or rather leſſened, for that is the true meaning of *Collee*), is the preſent era, which they ſuppoſed ordained to ſubſiſt four hundred thouſand years, of which near five thouſand are already paſt; and the life of man in that period is limited to one hundred years. See Hindoos.

We ſhall here ſubjoin Dr. Robertſon's obſervations on the above periods, from the Notes to his Hiſtorical Diſquiſition concerning India.

"If (ſays he, p. 360.) we ſuppoſe the computation of time in the Indian chronology to be made by ſolar, or even by lunar years, nothing can be more extravagant in itſelf, or more repugnant to our mode of calculating the duration of the world, founded on ſacred and infallible authority. From one circumſtance, however, which merits attention, we may conclude that the information which we have hitherto received concerning the chronology of the Hindoos is very incorrect. We have, as far as I know, only five original accounts of the different jogues, or eras of the Hindoos. The firſt is given by M. Rogers, who received it from the Brahmins on the Coromandel coaſt. According to it, the Suttee Jogue is a period of one million ſeven hundred and twenty-eight thouſand years; the Tirtah Jogue is one million two hundred and ninety-ſix thouſand years; the Dwapaar Jogue is eight hundred and ſixty-four thouſand. The duration of the Collee Jogue he does not ſpecify. (Porte Ouverte, p. 179.) The next is that of M. Bernier, who received it from the Brahmins of Benares. According to him the duration of the Suttee Jogue, was two million five hundred thouſand years; that of the Tirtah Jogue, one million two hundred thouſand years; that of the Dwapaar Jogue is eight hundred and ſixty-four thouſand years. Concerning the period of the Collee Jogue, he likewiſe is ſilent. (Voyages, tom. ii. p. 160.) The third is that of colonel Dow; according to which the Suttee Jogue is a period of fourteen million of years; the Tirtah Jogue one million eighty thouſand; the Dwapaar Jogue ſeventy-two thouſand; and the Collee Jogue thirty-ſix thouſand years. (Hiſt. of Hindoſt. vol. i. p. 2.) The fourth account is that of M. le Gentil, who received it from the Brahmins of the Coromandel coaſt; and as his information was acquired in the ſame part of India, and derived from the ſame ſource with that of M. Rogers, it agrees with his in every particular. (Mem. de l'Academ. des Sciences, pour 1772 tom. ii. part i. p. 176.) The fifth is the account of Mr. Halhed, which has been already given. From this diſcrepancy, not only of the total numbers, but of many of the articles in the different accounts, it is manifeſt that our information concerning Indian chronology is hitherto as uncertain as the whole ſyſtem of it is wild and fabulous. To me it appears highly probable, that when we underſtand more thoroughly the principles upon which the fictitious eras or jogues of the Hindoos have been formed, we may be more able to reconcile their chronology to the true mode of computing time, founded on the authority of the Old Teſtament; and may likewiſe find reaſon to conclude, that the account given by their aſtronomers of the ſituation of the heavenly bodies at the beginning of the Collee Jogue, is not eſtabliſhed by actual obſervation, but the reſult of a retroſpective calculation."

JOHADINGA, in *Geography*, a town of Bengal; 32 miles N.E. of Calcutta.

JOHAN, St., a town of France, in the department of the Sarre, on the Sarre, communicating by a bridge with Saarbruck.—Alſo, three towns in the duchy of Stiria.—Alſo, a town of the archbiſhopric of Salzburg; 30 miles S.S.E. of Salzburg.

JOHAN-GEORGEN-STADT, a town of Saxony, in the circle of Erzgeburg, founded in 1654 by the Proteſtant miners, who were driven from Platten in Bohemia, and ſo named after John George I. The corn, cultivated near the town, is inconſiderable, but the breed of cattle is good. The men are employed in mining, and the women in weaving lace. Ores of tin and ſilver have been formerly found near this place. Copper ore, cobalt, emery, and other minerals are now found; 24 miles S. of Chemnitz. N. lat. 50° 23′. E. long. 12° 40′.

JOHANNES, a ſmall iſland in the Pacific ocean, diſcovered in 1767. N. lat. 6° 50′. E. long. 132° 18′.

JOHANNESBERG, or Bichofsberg, a town of Germany, famous for its wine; 16 miles W. of Mentz.

JOHANNESBURG, a town of Pruſſia, in the province of Natangen, near the Spirding lake; 96 miles S.S.E. of Konigſberg. N. lat. 53° 22′. E. long. 22° 2′.

JOHANNS, St., a town of Auſtria; 11 miles S.S.E. of Glaggnitz.—Alſo, a town of Auſtria; 8 miles E. of Bavarian Waidhoven.

JOHANSTHAL, a town of Moravia, in the circle of Prerau, ſituated in Sileſia; 12 miles N.N.W. of Jagendorf.

JOHN *the* Baptist, in *Scripture Biography*, was the ſon of Zacharias, a prieſt of the courſe of Abia, and of Elizabeth, couſin to Mary, the mother of our Saviour. He was announced before his birth to Zacharias, who received inſtructions to call him John, and who was apprized of the high and honourable character which he was to ſuſtain, as the forerunner of the Meſſiah. See the account of his birth and office in the firſt chapter of St. Luke's Goſpel. Having withdrawn himſelf from ſociety, in order to prepare, by exerciſes of devotion, and ſtrictneſs of manners, for the duties of the office which was aſſigned him, he was called to commence his miniſtry when he was about thirty years of age; and, like the ancient prophets, he quitted his ſolitude in a garment of camel's hair, and diſtinguiſhed himſelf by abſtinence and ſelf-denial, and ſeverity of morals. His commiſſion was to proclaim the approaching advent and kingdom of the Meſſiah, and to qualify men, by repentance and reformation, for becoming partakers of the bleſſings which the great teacher and ſaviour was empowered to beſtow. The ſucceſs of his preaching was ſuch, that multitudes reſorted to hear him, and to be baptiſed by him in the waters of Jordan. His reputation was ſuch among the people, that many began to debate among themſelves, whether he was not the Meſſiah: and when the Jewiſh Sanhedrim, hearing of his fame, ſent ſcribes and phariſees from Jeruſalem to examine his pretenſions, John thought it ſufficient honour to be commiſſioned as the forerunner of the Meſſiah, and therefore explicitly declared that he was not the Meſſiah himſelf. At the appointed time Jeſus came to him from Nazareth, and after ſome heſitation, firſt from ignorance of his perſon and character, and afterwards, from humility and diffidence, John performed for him the religious rite of baptiſm, according to his requeſt. As ſoon as this ſervice was concluded, John had ample evidence preſented to him of the dignity and real character of Jeſus; for a lambent flame deſcended upon him with a kind of hovering dove-like motion, and a voice from heaven accompanied it, proclaiming "This is my beloved Son, in whom I am well pleaſed." John, being thoroughly ſatisfied that Jeſus was the promiſed and expected Meſſiah, eagerly embraced every opportunity that occurred of announcing him to the multitude, which attended his miniſtry, under this character. The diſciples of John became jealous of the increaſing fame of Jeſus; and fearful that the reputation and influence of their maſter would decline: but John corrected their miſapprehenſions, acknowledged his inferiority to Jeſus, and directed the people to transfer their views and regard from him, who was merely the forerunner of the Meſſiah and Saviour, to the perſon who really ſuſtained this high character, and to whom theſe honourable appellations belonged. In the courſe of John's miniſtry his fame commanded the attention of Herod, tetrarch of Galilee, and induced him to ſend for the preacher to his court; for ſome time his inſtruction and counſel ſeemed to impreſs the tetrarch's mind, and to give him pleaſure. But the fidelity of John would not permit Herod to form an inceſtuous connection with Herodias, his brother's wife, without ſeaſonable animadverſion and ſevere reproof. The tetrarch reſented the faithful reprehenſion of John, and committed him to priſon. During the interval of his confinement, Herodias was plotting his death: but Herod, for ſome time, partly from reverence for John, and partly from a dread of the people, who believed him to be a prophet, reſiſted the machinations of Herodias. An opportunity at length occurred, upon the birth-day of Herod, for the execution of the cruel purpoſe which this wicked woman had formed againſt John. Her daughter, by her former huſband, danced before the aſſembly that was convened in honour of his nativity, ſo much to the ſatisfaction of Herod, that he promiſed with an oath to grant her whatſoever ſhe requeſted, even though it ſhould be to the value of half his kingdom. The princeſs, inſtructed by her mother, requeſted that the head of John the Baptiſt ſhould be delivered to her in a charger, or large diſh. Herod was for ſome time reluctant; but upon her perſiſting in her requeſt, Herod complied, and ordered John to be beheaded in the priſon. The death of John the Baptiſt is mentioned by Joſephus in a paſſage, the genuineneſs of which is generally admitted by learned men. A diſpute had ariſen between Aretas, king of Petræa, the father of his firſt wife, whom he had put away for the ſake of Herodias, which was partly owing to this conduct, and partly to ſome difference that took place between them about the limits of their reſpective territories. In a conteſt between them Herod's whole army was defeated; and this defeat, ſays Joſephus, was conſidered by ſome of the Jews as a juſt puniſhment providentially inflicted on Herod, for the death of John, called the Baptiſt. For Herod, continues the Jewiſh writer, had killed him who was a juſt man, and had called upon the Jews to be baptiſed, and to practiſe virtue, exerciſing both juſtice towards men, and piety towards God: for ſo would baptiſm be acceptable to God, if they made uſe of it, not for the expiation of their ſins, but for the purity of the body; the mind being firſt purified by righteouſneſs. And many coming to him, for they were wonderfully taken with his diſcourſes, Herod was ſeized with apprehenſions, leſt, by his authority, they ſhould be led into ſedition againſt him, for they ſeemed capable of undertaking any thing by his direction, &c. (Antiq. l. xviii. c. 5. § 1, 2.) It has been ſaid by ſome perſons, that this paragraph contradicts our evangeliſts: for, acording to them, it was at the ſolicitation of Herodias and her daughter that John was beheaded. But here it is ſaid, that Herod put John to death becauſe he feared that he might be the cauſe of a ſedition. But the two accounts are by no means inconſiſtent: for Herod might have apprehenſions from John's popularity, and be diſpoſed, on that account, to take him off. See Lardner's Works, vol. vii. p. 117. The feſtival of the nativity of John the Baptiſt was appointed to be obſerved in the Chriſtian church on the 24th of June: the date of the firſt appointment is not known: but that it is to be placed before the end of the fourth century, appears from the ſermons of St. Auguſtine, adapted to the day.

JOHN *Baptiſt, Hermits of.* See HERMITS.

JOHN, *Saint*, an *apoſtle* and *evangeliſt*, was the ſon of Zebedee, a fiſherman, of the town of Bethſaida, on the ſea of Galilee, the younger brother of James the elder, (ſee JAMES,) and commonly reckoned the youngeſt of all Chriſt's diſciples. His mother's name was Salome. Zebedee, though a fiſherman, was not poor, and therefore we have no reaſon to imagine that his children were altogether illiterate, which ſome have imagined to have been the caſe, from a miſinterpretation of Acts, iv. 13, in which the terms *ἀγράμματοι* and *ἰδιῶται* denote perſons that were neither doctors nor magiſtrates, but men of private ſtations, who had not been educated in the ſchools of the Rabbies. (Grot. in loc.) See IDIOT. They were, without doubt, well acquainted with the ſcriptures of the Old Teſtament; having not only read them, but having heard them publicly read and explained in the ſynagogues. In common with other Jews, they entertained the expectation of the Meſſiah, and had heard John the Baptiſt preach, though they were not enliſted in the number of his diſciples. Before John was called to be an apoſtle, it cannot be queſtioned that he had ſeen and heard our bleſſed Lord, and had been witneſs of ſome of his miracles, particularly that at the wedding of Cana in Galilee. (See John, ii. 1 - 11.) His call to attend upon Jeſus ſtatedly is related Matt. iv. 21, 22. Mark, i. 19, 20. Luke, v. 1—10. From this time he and his brother James were the conſtant attendants on Chriſt; they heard his diſcourſes, and ſaw his miracles; and after previous inſtruction, both public and private, they were honoured with a ſelection and appointment to be of the number of the twelve apoſtles. What was his age at this time, his hiſtory does not preciſely aſcertain. Some have ſuppoſed that he was then 22 years old: others conjecture that he was about 25 or 26; and others again think, that he was about the ſame age with our Saviour. Dr. Lardner is of opinion, that none of the apoſtles of Chriſt were much under the age of 30, when they were appointed to this important office. However it be, John ſeems to have been the youngeſt of the twelve, and to have been diſtinguiſhed by a temper ſingularly mild, amiable, and affectionate. He was eminently the object of our Lord's regard and confidence, and admitted, on various occaſions, to free and intimate intercourſe with him; ſo that he was characterized as "the diſciple whom Jeſus loved." The evangelical hiſtory recites many inſtances which evince the intimacy that ſubſiſted between him and his maſter, and the high opinion which our bleſſed Lord entertained of his diſpoſition and character. His failings, however, did not eſcape notice; and he was reprehended for them by our Lord. Notwithſtanding his affectionate attachment to Chriſt, and the numerous inſtances of kind and condeſcending attention with which he had been honoured, he, in common with the other apoſtles, betrayed a culpable timidity in forſaking him during his laſt conflict; though he afterwards recovered his firmneſs, and attended the crucifixion: and, indeed, he ſeems to have been the only apoſtle who thus hazarded garded his own ſafety. On this occaſion he was diſtinguiſhed by the notice of his maſter, and by the recommendation of his mother to the future protection of this apoſtle. He was alſo a witneſs of the circumſtances that aſcertained our Lord's death and burial. After his reſurrection John was the firſt who entertained the belief that he was really riſen from the dead. On ſubſequent occaſions, when Jeſus manifeſted himſelf to his diſciples, and thus evinced the reality of his reſurrection, John was one of the number. In one of theſe interviews, when Peter, having received information of the manner of his own death, inquired with a reprehenſible curioſity concerning the fate of John, our Lord replied, "what if he tarry till I come," thus intimating either that he would ſurvive the deſtruction of Jeruſalem, or that his life would be prolonged till it was terminated in the courſe of nature. After the aſcenſion of Chriſt, and the effuſion of the Spirit on the day of pentecoſt, John became one of the chief apoſtles of the circumciſion, and exerciſed his miniſtry at and about Jeruſalem, in the manner and with the ſucceſs related in the book of Acts: he was preſent at the council of this city held in the year 49 or 50. (See Acts, xv.) Until this time he probably remained in the land of Iſrael, and had not travelled into any foreign countries. During his ſtay in Judea, it appears that he wrought many miracles. From the book of Revelation (chap. i. 9.) we learn, that St. John was for ſome time in the iſland of Patmos, where he was favoured with viſions and revelations. He is ſuppoſed to have been baniſhed thither in the 14th year of Domitian, and to have returned in the beginning of the reign of Nerva; ſo that his exile could not have laſted more than two years, or perhaps not above a year. From eccleſiaſtical hiſtory we learn that he lived to a great age, and that in the latter part of his life he reſided in Aſia, particularly at Epheſus, the chief city of that country. His ſettlement in Aſia ſeems, from ſeveral circumſtances, to have taken place about the time when the war broke out in Judea, in the year 66, or a ſhort time before, when probably St. Peter and Paul had been previouſly crowned with martyrdom. According to Irenæus, this apoſtle lived in Aſia till the time of Trajan, who ſucceeded Nerva, A.D. 98. From other accounts it appears that he died at Epheſus, and was buried near that city, about 68 years after our Lord's paſſion. Suppoſing our Lord to have been crucified in the year 32 of the vulgar era, which ſeems to have been Jerom's opinion; 68 years will extend to the year 100, or the third of Trajan; at which year of that emperor the death of St. John is placed by Jerom in his chronicle. At the time of his death it is not incredible, nor unlikely, that he was about 100 years of age. Some other particulars have been recorded concerning this apoſtle, which the moſt impartial critics have reckoned fabulous. It is related of him, that going to bathe at Epheſus, and perceiving that Cerinthus, or, as others ſay, Ebion, was in the bath, he came out haſtily without bathing, ſaying to thoſe that were with him, "Let us flee hence, leſt the bath ſhould fall while Cerinthus the enemy of the truth is within." It is alſo ſaid, that by order of the emperor Domitian, St. John was caſt into a cauldron of boiling oil at Rome, and came out again without being hurt. The following account, given by Jerom, of St. John's method of preaching when he was far advanced in years, and not able to make a long diſcourſe, is more worthy of credit. "The bleſſed apoſtle John, living at Epheſus to extreme old age, and being with difficulty carried to church in the arms of the diſciples, and being unable to make a long diſcourſe every time they aſſembled, was wont to ſay nothing but this; "Little children, love one another." At length the diſciples and brethren who attended, tired with hearing ſo often the ſame thing, ſaid, "Sir, why do you always ſay this?" who then made this anſwer, worthy of himſelf: "Becauſe," ſays he, "it is the Lord's command; and if that alone be done, it is ſufficient."

The writings which are generally aſcribed to St. John, and received as his, are a goſpel, three epiſtles, and the book of Revelation.

The goſpel of St. John has been univerſally received as genuine; and, as it is generally allowed that he had ſeen the other three goſpels, it may be conſidered as a kind of ſupplement to theſe, containing ſeveral things that occur in them, and many others which they have omitted. In the account of our Saviour's perſecution, death, and reſurrection, all four goſpels coincide in many particulars; though here St. John has various things peculiar to himſelf. In his goſpel many things recorded by the other evangeliſts are omitted. He has given us no account of our Saviour's nativity, nor of his baptiſm by John. He takes no notice of our Saviour's temptation in the wilderneſs; nor of the call, or names of the 12 apoſtles; nor of their miſſion in the time of our Saviour's life; nor of our Lord's parables, or other diſcourſes of his, recorded by them; nor of our Saviour's journies, of which they give an account; nor of any of thoſe predictions relating to the deſolations of Jeruſalem, which are found in the goſpels of Matthew, Mark, and Luke; nor has he repeated any miracles recorded by them, excepting only that of the multiplication of ſmall proviſion for feeding 5000, with the extraordinary circumſtances of the return to Capernaum from the country, where that miracle had been wrought. But he mentions ſeveral incidents which the other evangeliſts have not noticed. St. John gives an account of our Lord's cleanſing the temple, at his firſt paſſover, when he went to Jeruſalem; but all the other evangeliſts give a like account of his cleanſing the temple at the laſt paſſover. Theſe two acts are, however, different. He gives an account of the acts of Chriſt before the impriſonment of John the Baptiſt; of the wedding at Cana; of Nicodemus; of the woman of Samaria; of the cure of the man blind from his birth; of the reſurrection of Lazarus; of the indignation of Judas at the woman who anointed the Lord with ointment; of the Greeks that came to Jeſus; of Chriſt waſhing the feet of his diſciples; and of the conſolatory inſtructions, which he delivered to his apoſtles previouſly to his death, &c. St. John's goſpel contains alſo more plain and frequent aſſurances than thoſe that occur in the other goſpels, that Jeſus is not only a prophet and meſſenger of God, but the Chriſt, the Son of God, or that great prophet, that ſhould come into the world; referring, as many ſuppoſe, by peculiar expreſſions, to his pre-exiſtent dignity, though others think theſe expreſſions to be figurative.

Writers are not agreed as to the time when this goſpel was written. St. John, according to Mill, Fabricius, and Le Clerc, wrote his goſpel at Epheſus, after his return from the iſle of Patmos, A.D. 97, at the deſire of the Chriſtians of Aſia. Wetſtein thought that this goſpel might be written about the year 32 after our Lord's aſcenſion. Baſnage and Lampe ſuppoſed that it was written before the deſtruction of Jeruſalem: Dr. Lardner adopts this opinion, and aſſigns the date of it to the year of Chriſt 68. This period brings it nearer to that of the three other goſpels, which was about the year 64 or 65, and the goſpel itſelf, the leading deſign of which was to ſhew how inexcuſable the Jews were in not receiving Jeſus as the Chriſt, and to vindicate the providence of God in the calamities already befallen, or now coming upon them, was ſuitable to the circumſtances of the Jews at this period. It is obſerved by Dr. Lardner, as an evidence that it was one great deſign of St. John, in writing this goſpel, to ſhew the unreaſonableneſs and great guilt of the Jews in rejecting Jeſus, that in his goſpel are inſerted more inſtances of their attempts upon our Lord's life than in the other goſpels. Chryſoſtom was of opinion, that St. John did not write his goſpel till after the deſtruction of Jeruſalem. John, he ſays, writes not any of the things that occur in Matt. xxiv., leſt it ſhould be thought that he took an advantage from the event: for he was living a good while after the deſtruction of Jeruſalem. But the other evangeliſts, who died before the deſtruction of Jeruſalem, and ſaw none of theſe things, record theſe predictions. But John, if he wrote at the time above ſpecified, *viz.* when the event was near, might omit theſe predictions, as they were ſufficiently recorded already, and as it is not his manner to repeat what had been related before. He gives, however, ſeveral intimations of the miſeries that were coming upon the Jewiſh people. (Ch. iii. 36. iii. 18, 19. viii. 12. 21. 24. ix. 39—41. xii. 35, 36.) Mr. Whiſton, obſerving that St. John uſes the Roman or Julian beginning of the day in his goſpel, and reckons the hours from midnight and noon, urges this as an argument for the goſpel having been written after the deſtruction of Jeruſalem, and the period of the Jewiſh polity, at Epheſus, a place remote from Judea, and under the Roman government. To this it is replied, that St. John does not compute the hours of the day after the Roman, but rather after the Jewiſh manner; and, ſuppoſing St. John to have uſed the Roman method of computation, it does not follow that he wrote after the deſtruction of Jeruſalem, &c. As the goſpel was written at Epheſus, at a diſtance from Judea, he might, if he thought fit, have uſed the Roman way of reckoning, eſpecially when the period of the Jewiſh commonwealth was near, though not quite accompliſhed. The late date of the goſpel has been alſo argued, from what ſome have alleged, to have been the object or end of the writer. Accordingly, many ancient and ſome modern writers ſay, that this goſpel was written with a deſign to remove the errors of the Cerinthians, Ebionites, and other ſects, which cannot be ſuppoſed to have appeared before the deſtruction of Jeruſalem, and the overthrow of the Jewiſh people. But Mr. Lampe and Dr. Lardner have urged ſeveral reaſons to ſhew that St. John did not write againſt Cerinthus, or any other heretics in his goſpel; and that it was written before the riſe of thoſe hereſies, which are ſaid to be confuted by it. Lardner thinks that it would have been below an evangeliſt to write againſt heretics in the hiſtory of his Lord and maſter; and that none of the evangeliſts have entered into a particular account of things after our Lord's aſcenſion. Nothing of this kind, ſays this writer, occurs in the reſt of St. John's goſpel; and, therefore, why ſhould we imagine that there is any ſuch thing in the introduction; the deſign of which is to ſhew, that Jeſus came and acted by the authority of God, the Creator of the world, the God and ſupreme Lawgiver of the Jewiſh people. Some have thought, and particularly Grotius, that St. John concluded his goſpel with the words, which are at the end of the 20th chapter; and that which is in the 21ſt chapter was added after St. John's death by the church of Epheſus. But this opinion is contradicted by the general, or even univerſal, conſent of manuſcripts and verſions: to which it may be added, that none of the ancient Chriſtian writers ever made a queſtion, whether this chapter was compoſed by St. John or another. Moreover, the ſtyle is St. John's. Lardner's Suppl. to the Credibility, or Works, vol. vi. chap. 9.

Beſides the goſpel, St. John wrote three epiſtles, which are generally received in theſe parts of the world. The genuineneſs of the firſt epiſtle does not ſeem to have been ever queſtioned. It is referred to by Polycarp, and the martyrs of Lyons, and quoted by Papias. The firſt and ſecond epiſtles are cited by Irenæus, and received by Clement of Alexandria. Origen mentions three epiſtles, though he ſays that the ſecond and third were not allowed by all to be genuine. Dionyſius of Alexandria receives the firſt epiſtle, calling it the “Catholic epiſtle,” and he mentions the other two as aſcribed to St. John. The firſt epiſtle was received by Cyprian, and probably the other two. The ſecond epiſtle is quoted by Alexander, biſhop of Alexandria. Euſebius ſays, “that beſides the goſpel, his firſt epiſtle is univerſally acknowledged by thoſe of the preſent time, and by the ancients; but the other two are contradicted,” *i. e.* doubted of by ſome. All the three epiſtles were received by Athanaſius, by Cyril of Jeruſalem, by the council of Laodicea, and by Epiphanius. All three were received by Jerom: and the two laſt were doubted of by ſome in his time. All three were received by Rufinus, by the third council of Carthage, by Auguſtine, and by all thoſe authors who received the ſame canon of the New Teſtament with our's. All three are in the Alexandrian MS. and alſo in the catalogues of Gregory Nazianzen and of Amphilochius. The Syrian churches, however, received only one; nor were any more received by Chryſoſtom. Upon the whole we may obſerve, that one epiſtle was received by all as certainly genuine; and it is not of any importance to contend about the other two, as they are ſo very ſhort, and reſemble the firſt in ſentiment, phraſe, and manner of writing. The ſecond epiſtle conſiſts of only thirteen of our verſes; and of theſe eight may be found in the firſt, either in ſenſe or expreſſion. See CANON.

As to the time when theſe epiſtles were written, critics and commentators have entertained different opinions. Grotius, Hammond, and Whitby, ſuppoſe the firſt to have been written before the deſtruction of Jeruſalem, and the former thinks the place of writing it was Patmos. Dr. Benſon inclines to date it in the year of our Lord 68. Mill and Le Clerc refer it to the year 91 or 92; Baſnage to the year 98, and Baronius to 99. Beauſobre and Lenfant refer it to the end of the firſt century, when the apoſtle was far advanced in age. Whiſton thought that this, and the two other epiſtles of St. John, were written not long after each other, about the year of Chriſt 82 or 83. Lampe ſuppoſes the firſt epiſtle to have been written after the Jewiſh war, before St. John's exile in Patmos, and, probably, ſome conſiderable time before it: ſo that he nearly agrees about the time of the epiſtle with Whiſton. Dr. Lardner, conſidering that there are no expreſſions in the epiſtle declaring the time of it, or clearly referring to the calamities attending the downfal of the Jewiſh ſtate, thinks it probable, that it was not written till a good while after that event, about the year of Chriſt 80, or later. Some have thought that the firſt epiſtle was written to Jewiſh believers in Parthia; and others are of opinion, that it was addreſſed to the Jewiſh Chriſtians in Judea and Galilee. Others think it more probable, that it was directed to all believers, Gentiles as well as Jews; though Jewiſh believers are eſpecially regarded. The ſecond epiſtle is inſcribed “The elder to the elect lady, and her children.” By the “elect lady” ſome have underſtood the Chriſtian church in general, and others underſtand the appellation as deſigned to expreſs ſome particular church. Others again have ſuppoſed, that it was addreſſed to a female of the name of “Electa,” or “Eclecta;” and ſome have rendered the inſcription “to the elect Kyria.” Others again underſtand the inſcription agreeably to our own tranſlation; and this has been the common opinion, ſupported by the authorities of Beza, Mill, Wolfius, Wall, Le Clerc, and others.

The third epiſtle of St. John is inſcribed, "The elder to the beloved Gaius." There were two perſons of this name, mentioned in the Acts (xix. 29.), and in St. Paul's epiſtles (1 Cor. i. 14. Rom. xvi. 23.) He ſeems to have been an eminent Chriſtian, who lived in ſome city of Aſia, not far from Epheſus, where St. John chiefly reſided, after his leaving Judea. Concerning the caſe to which St. John refers in this epiſtle, there have been various ſentiments of learned men. Grotius ſuppoſed that the ſtrangers here ſpoken of were believing Jews, whom Diotrephes, a gentile, and biſhop of Pergamos, would not receive, becauſe they were Jews, or becauſe they were for blending the rites of the law with Chriſtianity. Others think, that Diotrephes was a Jew, and zealous for the law, and that he would not admit theſe ſtrangers, converts from among the Gentiles, becauſe they did not conſent to the obſervance of the rites and ceremonies of the law of Moſes. Learned men have lately been of opinion that St. John here ſpeaks of ſome, particularly Jews, who had gone out into the world, to propagate the Chriſtian religion, without receiving any pecuniary recompence from thoſe whom they had converted to the Chriſtian faith: and they think, that Caius or Gaius is commended by St. John for encouraging ſuch teachers, whilſt he blamed Diotrephes for not receiving and helping them. But this opinion is rejected by Lardner as unfounded, and he ſees nothing that ſhould lead us to think preachers here ſpoken of, but only ſtrangers in want. Some have ſuppoſed, that Diotrephes excommunicated, or caſt out of the church, the "brethren," members of it, who were for receiving theſe ſtrangers. Others ſuppoſe that the perſons, whom Diotrephes caſt out of the church were theſe ſtrangers, not members of the church. It is ſuppoſed, that Diotrephes had the diſpoſal of the revenues of the church; and that he oppoſed the diſtribution of the common ſtock to theſe ſtrangers, partly Jews and partly Gentiles, who needed relief, and diſcouraged ſuch as were willing to aſſiſt them out of their own property. Concerning the time of writing theſe two epiſtles, nothing can be ſaid with certainty. Mill places them about the ſame time with the firſt, in 91 or 92. Whiſton ſuppoſes, that all three were written about the year 82 or 83. Dr. Lardner conceives, that St. John was ſomewhat advanced in age, and that he had reſided a good while in Aſia, before he wrote any of theſe epiſtles. Hence he concludes, that theſe two were not written ſooner than the firſt; and if the firſt was written about the year 80, theſe two may be reckoned to have been written between the years 80 and 90. See EPISTLE. Lardner's Works, vol. vi. chap. 20.

The book of Revelation has been alſo aſcribed to St. John. See REVELATION.

JOHN, *St.*, *Chriſtians of.* See CHRISTIANS.

JOHN, ſurnamed *Mark.* See MARK.

JOHN I. emperor of the Eaſt, ſurnamed *Zimiſces*, was an Armenian noble, who ſerved with diſtinction in the armies of Romanus the younger. After the death of that emperor, he aſſiſted Nicephorus Phocas in his elevation to the empire and his marriage of the imperial widow, Theophano. Zimiſces became an object of ſuſpicion to Nicephorus, who deprived him of the poſt of general of the Eaſt, in which he had been generally victorious, and baniſhed him from court. The hero was reſolved to be revenged for the indignities inflicted on him, and having inſinuated himſelf into the good graces of the empreſs, he contrived a plot to take away her huſband's life. The plan ſucceeded, Nicephorus was ſlain, and John was immediately declared emperor, A.D. 969. Before the patriarch would conſecrate him he was told he muſt, by public penance, expiate the crime of which he had been guilty. John threw the blame of the deed on his companions, and readily agreed to ſeparate himſelf from them. Theophano parted in a paroxyſm of rage, and was immediately ſhut up in a monaſtery of Armenia. The reign of John was chiefly ſpent in military tranſactions, in which his valour and good fortune were equally conſpicuous. He obtained many victories over the Ruſſians, Bulgarians, and Saracens; and is ſuppoſed to have fallen a ſacrifice to the eunuch Baſil, whom he had offended, after a reign of ſix years. John Zimiſces, though arriving at the crown by an act of treaſon, wore it with glory, and ſeemed to merit it by his public and private virtues. His piety is extolled by writers of the time, and he is recorded as the firſt emperor who cauſed the effigy of Chriſt to be ſtamped upon the coin, with the legend, "Jeſus Chriſt, the King of Kings."

JOHN II. emperor of the Eaſt, was born in 1088, and ſucceeded his father Alexius in 1118. Soon after his acceſſion a conſpiracy was excited againſt him by his ſiſter, the celebrated Anna Comnena, to depoſe him in favour of her huſband Bryennius. The conſpiracy was diſcovered in time to prevent the evils that would otherwiſe have reſulted from it. This was the only domeſtic trouble by which his reign was diſturbed, and he had the happineſs of being able, during an adminiſtration of twenty-five years, to baniſh capital puniſhments from the whole empire, not excepting the caſe of thoſe perſons who had engaged with his ſiſter to take away his life. Againſt the public enemies of his country he was active and ſucceſsful, and he entertained the ambitious project of extending the eaſtern empire to its former limits, and recovering Antioch from the dominion of the Latins. He not only planned the enterprize but actually ſet out on the buſineſs, accompanied by his two ſons. Theſe were carried off by a premature death, and he himſelf died ſhortly after, in 1143, of a wound from one of his own poiſoned arrows. He was called the "Handſome," an appellation which has been thought to have been applied ironically: but whatever the qualities of his body were, his ſoul was formed in the mould of moral beauty, and few poſſeſſors of a throne have graced it with purer manners and more humane principles.

JOHN III., DUCAS, ſurnamed *Vataces*, emperor of the Eaſt, was born in 1193, and ſucceeded, by virtue of his marriage with the daughter of Theodore Laſcaris, to the throne at the death of that prince. Conſtantinople, the capital of the empire, was, at this period, in the hands of the Latins, as was likewiſe a conſiderable part of the empire. John, however, was a prince of great virtue, and recovered all the other places which had been taken by the Latins, and reduced under his dominion the European territories almoſt to the gates of Conſtantinople, and nearly the whole of Leſſer Aſia. He fought and gained many battles, defeating the Scythians, Tartars, and Bulgarians, and extended his empire on all ſides. While he was thus diſtinguiſhed in war, he was equally illuſtrious in the internal adminiſtration of his affairs, by which he reſtored proſperity to the haraſſed ſubjects of the eaſtern empire. He encouraged agriculture, and the uſeful arts, and promoted ſimplicity and regularity of manners. He died in 1258, after a glorious reign of 33 years.

JOHN IV., LASCARIS, ſon of Theodore the younger, whom he ſucceeded in 1259, at the age of ſix years, but ere he had ſat on the throne a ſingle year, he was deprived of his eyes, and impriſoned for life, by the deſpot Michael Palæologus.

John V., Cantacuzenus, emperor of the Eaſt, deſcended from the Paladins of France, was one of the principal confidants of the younger Andronicus, at the time of his revolt from his grandfather, and acted with great fidelity in the ſervice of the young prince, in whoſe reign he held the office of great domeſtic, by virtue of which he ruled both the emperor and the empire. At the death of Andronicus in 1341, Cantacuzenus was left guardian to the eldeſt of his ſons, then but nine years of age, and was made regent of the empire. His adminiſtration was diſturbed by the ambition of the great duke Apocaucus, who encouraged the empreſs dowager to aſſert a maternal right to the tutelage of her ſon, and by the patriarch John, who laid claim himſelf to the office of guardian. In ſelf-defence, therefore, Cantacuzenus cauſed himſelf to be made emperor in 1342, which produced a civil war, in which he was, at firſt, ſo far unſucceſsful, that he was obliged to quit his country and take refuge in Servia. After a ſeries of misfortunes he was at length, in 1347, received as a conqueror into Conſtantinople. He now aſſociated himſelf with his ward in the empire, but the union was ſoon interrupted by inteſtine diviſions, which, in 1355, he put an end to by a voluntary abdication, when he took the religious habit in a monaſtery of mount Athos. Here he employed himſelf in compoſing a hiſtory of the tranſactions to which he had been witneſs; and this work, compriſing a period of forty years, from the revolt of the younger Andronicus to his own abdication, is one of the moſt elegant productions of the modern Greeks. He likewiſe engaged in a religious controveſy, and compoſed four books againſt the Jews and Mahometans. This work was publiſhed at Baſil in 1543; and of his Hiſtory there is a Louvre edition in three volumes, fol. 1655. He is ſaid to have died in 1411: a letter to him from pope Gregory XI., in 1375, is ſtill extant. Theſe are the only emperors of the name of John that require any notice in this work. Gibbon. Univerſal Hiſtory.

John, king of France, ſucceeded his father, Philip of Valois, in 1350, being, at the time, forty years of age. One of his firſt acts was to put to death, without the form of trial, the conſtable, count d'Eu, who was ſuſpected of being in the intereſt of Edward III., king of England. This arbitrary act occaſioned much diſcontent among his nobles, whom he attempted to appeaſe by the inſtitution of the order of the ſtar, in imitation of Edward's order of the Garter, but being too laviſh of the new honour, it was brought into contempt. A war broke out between England and France, and John ſummoned the ſtates-general for the purpoſe of raiſing the neceſſary ſupplies. In the aſſembly of theſe ſtates it was agreed that no propoſition ſhould be admitted without the unanimous conſent of the three orders, which gave to the third eſtate an authority and independence which aſſimilated them to the commons of England. John made conſiderable conceſſions, and was enabled thereby to raiſe a powerful army. It was in this conteſt that the king of France was oppoſed to the Black Prince of England: at Maupertuis, near Poictiers, they met; the former with an army of ſixty thouſand men, the latter could ſcarcely enumerate twelve thouſand effective ſoldiers. Edward, feeling the diſadvantageous ground on which he ſtood, offered to reſign his priſoners, and the booty which he had already made, and to ſign a truce for ſeven years, provided he might be permitted to return to his own country in ſecurity, but John, confident of ſucceſs, required him to ſurrender himſelf a priſoner, with the principal officers of his army. This demand brought on the famous battle of Poictiers, on the 19th of September, 1356, in which John was made priſoner, and many of the French nobility loſt their lives. The captive monarch, though reſpectfully treated, was brought to England to grace the triumph of the conqueror; the peace, in 1360, put an end to his captivity, but to obtain his liberty he made over many of the moſt valuable provinces of his kingdom to the king of England, and agreed to pay a ranſom of three millions of gold crowns. The diſaſters to which he had already been ſubject, had ſo little effect in teaching him political wiſdom, that at the perſuaſion of pope Urban V. he took the croſs, and ſeriouſly reſolved upon an expedition into the Holy Land. The execution of this project was prevented by the diſhonourable eſcape of his ſon Lewis, count of Anjou, from England, where he was detained as a hoſtage. The king's ſenſe of juſtice and honour determined him inſtantly to return to England in the ſtead of his ſon. He landed in 1364, and was received by Edward with great magnificence; but he was ſhortly after attacked with a diſeaſe, of which he died at the palace at the Savoy in April, in the 56th year of his age, and the 14th of his reign. John was poſſeſſed of many noble qualities, but he was not gifted with very ſuperior talents: he was author of the maxim, "That if juſtice and good faith were baniſhed from the reſt of the world, they ought to find refuge in the hearts of princes." Univer. Hiſt. Hume.

John, king of England, born in 1166, was the youngeſt ſon of Henry II. by queen Eleanor of Guienne. He was his father's favourite, nevertheleſs he joined his brother Richard in thoſe projects againſt Henry, which induced the unhappy king, on his death-bed, to pronounce a curſe upon his children. He was left without any particular proviſion, which circumſtance gave him the name of "Lack-land." Richard, upon his acceſſion to the throne, behaved with the utmoſt liberality to John, but his generoſity could not attach him to his intereſt. During his abſence in the Holy Land, he formed ſecret intrigues with Richard's rival and inveterate foe, Philip king of France. Theſe broke out into open rebellion, but being unſucceſsful, he threw himſelf upon his brother's mercy. With a knowledge of his character, Richerd ſaid to his interceſſor, queen Eleanor, "I forgive him, and hope I ſhall as eaſily forget his ingratitude and injuries, as he will my pardon." John, who was utterly void of all ſenſe of honour and generoſity, proved the baſeneſs of his nature by the act with which he purchaſed forgiveneſs. He invited the officers of Philip's garriſon of Evreux to an entertainment, cauſed them to be all maſſacred, put the ſoldiers to the ſword, and delivered up the town to his brother. He aſcended the throne at the death of Richard in 1199, but he did not obtain an undiſputed ſucceſſion. War was excited in favour of Arthur of Britanny, in which the young prince fell into the hands of his uncle John: he was at firſt confined in the caſtle of Falaiſe, and his uncle in vain endeavoured to procure his aſſaſſination. At length he was conducted to the caſtle of Rouen, where John reſided, and he was never after heard of. The manner of his death was uncertain, but it is generally believed that the king ſtabbed him with his own hands. From this period John became the object of univerſal deteſtation, and all his foreign ſubjects prepared to throw off the yoke. The pope alſo excommunicated him, and abſolved his ſubjects from their allegiance. He for ſome time reſiſted the papal authority, but in 1213 he made his ſubmiſſion. The pope, now regarding England as his own, and jealous of the aggrandizement of Philip of France, ſent a meſſage to that prince, acquainting him with John's return to his duty towards the church, and requiring him to deſiſt from hoſtilities againſt a country now under the protection of the holy ſee. Philip had, however, made preparations for war, and was not to be put off from his plans by the mere order of the holy pontiff. A battle enſued, in which the fleet of England triumphed over that of France, and John even thought of regaining his former poſſeſſions; but the attempt was unſucceſsful, and he was obliged to return in diſgrace. His own barons, who had ſuffered by his controul, determined now to aſſert their privileges, and laid a ſtatement of their grievances before the king, which he attempted to elude. To ſecond their efforts they choſe a general, and immediately proceeded to warlike operations. They were received into London with open arms, which ſo intimidated the king, that he was obliged to ſubmit to ſuch articles of agreement as they thought fit to dictate. At Runnymede, John ſigned the famous Magna Charta, the baſis of Engliſh liberty, which not only protected the nobles againſt the crown, but ſecured many important rights and privileges to every order of freemen. It was ſtipulated that London ſhould remain in the hands of the barons, and the Tower in the cuſtody of the primate, till the articles of the charter were executed. The king made another attempt to retrieve his affairs by inliſting under his banners foreign troops, but moſt of his projects failed, and he died partly of diſeaſe, and partly of chagrin, at Newark, in October 1216. The character of this prince is tranſmitted to us in very black colours: perhaps his vices have been exaggerated. Ingratitude, perfidy, and cruelty were certainly the ruling principles of his conduct. His private life was ſtained with licentiouſneſs, and he ſeems to have paid no regard to the forms of religion. The beſt part of his conduct as a ſovereign, was the attention which he paid to commerce and maritime affairs. In his reign London received the gift of its popular conſtitution of the corporation. Hume. Henry.

John I., king of Portugal, natural ſon of Peter the Severe, was born about the year 1350, and raiſed to the throne in 1383, to the prejudice of John of Caſtile, who claimed in right of his wife Beatrix, daughter of Ferdinand. Soon after his acceſſion, the king of Caſtile invaded Portugal with a powerful army, but victory, which decided in favour of John, permanently fixed him on the throne. In 1387 he married Philippa, daughter of John of Gaunt, duke of Lancaſter. It was not till the year 1400, that a peace was finally ſettled between the two countries, which remained inviolate during the reſt of the reign. John employed the ſeaſon of public tranquillity in improving the police, and promoting the proſperity of his kingdom. Mindful of his former condition, he behaved with great condeſcenſion and familiarity to his ſubjects, and beſtowed his favours liberally. Though his bounty kept him poor, he moderated his impoſts, and found reſources in his frugality with reſpect to the ordinary amuſements of a court. He was accuſtomed to ſay that converſation was the cheapeſt of all pleaſures, as well as the moſt improving, and he promoted a taſte for letters among the nobility. He was, however, inflexible in the puniſhment of crimes, and by his ſeverity in this reſpect, he rooted out the bands of bravoes kept by the nobility to execute private revenge. In 1414, he fitted out a formidable expedition againſt the Moors, in which he was ſucceſsful, and he entruſted to his ſon Henry, duke of Viſeo, the chief management of affairs in Africa, which gave occaſion to that courſe of maritime diſcovery by which he became ſo much diſtinguiſhed. (See Henry.) The concluding cares of this ſovereign were occupied in the ſettlement of his family, in which he was very ſucceſsful. He died in 1433, after a long and proſperous reign, leaving behind him the character of one of the ableſt and beſt of the Portugueſe ſovereigns, under the title of "the father of his country." He is regarded as the founder of a new royal family.

John II., king of Portugal, ſon of Alphonſo V. was born in the year 1455. In 1476, he was appointed regent, and, in 1481, he aſſumed the whole power of king on the death of his father. Finding that the adminiſtration of juſtice was become exceedingly corrupt, he appointed a commiſſion to enquire into abuſes, and to reform whatever was wrong. He watched over the conduct of the judges, forewarning them of his diſpleaſure if they proved backward in the equitable diſcharge of their duties. "Take care," ſaid he, to one of them, "I hear you keep your hands open and your doors ſhut:" this timely warning ſufficed for his reformation. A conſpiracy was ſhortly formed againſt his life, at the head of which was the duke of Viſeo, a very young man and the queen's brother. The king, on being informed of it, ſent for the duke to court, and taking him aſide, charged him with his treaſonable purpoſe. What particularly paſſed on this occaſion is not known, but the reſult was, that the king drew his dagger, and laid the duke dead at his feet. Several of the other conſpirators were apprehended, ſome were executed, and others went into voluntary exile. John, willing to ſhew that he was not unneceſſarily ſevere, reſtored the forfeited eſtates of the duke of Viſeo to his brother, whom he likewiſe raiſed to high dignity in the ſtate. It is to the honour of this prince that he was the patron of commerce, particularly of that opened to the Portugueſe by their ſettlements on the coaſt of Guinea. Being told by Cano, the diſcoverer of Congo, that the natives concealed their gold-mines, "Never look for them," ſaid the king, "carry them what they want, and you will get their gold without digging for it." He did much towards the diſcovery of the paſſage by the Cape of Good Hope; but he had the mortification of reflecting, that by his refuſal of the propoſals of Columbus, he miſſed the opportunity of adding the weſtern world to his dominions. About the year 1490, he was grievouſly affected by the death of his only ſon, who was killed by a fall from his horſe at a race. He endeavoured, after this, to introduce his natural ſon George into the ſucceſſion, but the great oppoſition which he met with in this ſcheme induced him to lay aſide the project. He died in October 1495. The chief object of his reign ſeems to have been, to depreſs the nobility, to raiſe the inferior orders, and to promote the commercial proſperity of his kingdom.

John III., king of Portugal, was born in 1502, and ſucceeded to the crown in 1521. The events of this reign are in many reſpects important, and attach to them very ſerious conſequences. In the time of this prince the execrable inquiſition was introduced into Portugal, of which it was the curſe nearly three hundred years, and has only been aboliſhed within theſe few months, at the ſuggeſtion or demand of the Britiſh court. John ſent miſſionaries into the Eaſt Indies, of whom the celebrated Xavier was one. The new ſettlement of Brazil was brought into a flouriſhing ſtate in this reign, and particular attention was paid to the converſion of the natives. The king was attentive to what he believed would conduce to the happineſs of his ſubjects; he was economical with regard to himſelf, and unwilling to burden his ſubjects with new taxes. From his own reſources he founded hoſpitals, conſtructed fortifications, highways, and aqueducts, reſtored the univerſity of Coimbra, and executed other projects of utility and ſplendour. John died of an apoplexy in 1557, at the age of fifty-five, after a reign of thirty-five years. He was ſucceeded by his grandſon Sebaſtian, a minor.

JOHN IV., king of Portugal, born in March 1604, was ſon of Theodoſius, duke of Braganza, of the royal line. He ſucceeded his father in that dukedom in 1630, for, at that time, the Spaniards had taken poſſeſſion of the Portugueſe government, and annexed the country to the crown of Spain. It was become, in the reign of Philip IV., a domain of Caſtile, intended for the enriching of favourites. The oppreſſions and indignities ſuffered by the Portugueſe had inflamed their diſcontents to the higheſt pitch, and they were only waiting for a leader, to break forth into a general revolt which they meditated. They fixed on the duke of Braganza, and offered him the crown of Portugal, if he would ſtand forth in their cauſe, and merit the high honour by his proweſs. The Spaniſh court, aware of their intentions, practiſed a variety of arts to get the duke into its power. The higheſt honours were offered him, in hopes of alienating him from the Portugueſe cauſe; when theſe proved ineffectual, he was invited, or rather ordered, to come to Madrid to confer on ſtate affairs, and the impoſſibility of excuſing himſelf from this ſtep, haſtened his final determination. The leaders of the conſpiracy preſſed him again to accept of the crown; he heſitated, but on conſulting the ducheſs, ſhe confirmed him, with this heroic addreſs, "My lord, a violent death awaits you with certainty at Madrid, perhaps at Liſbon; at the former place you muſt die as a wretched priſoner; here, covered with glory, and a king. Let us confide in the love of the people, your juſt claim, and the protection of heaven." He accordingly acquieſced, a revolution was effected in his favour in December 1640, and he was inſtantly proclaimed John IV. The new ſovereign was acknowledged by all the powers of Europe, not immediately under the influence of the houſe of Auſtria, a conſpiracy was however formed againſt his life and throne, but it was diſcovered and ſuppreſſed, and a treaty with France and the United Provinces aſſiſted Portugal in foiling the attempts of Spain to recover its ſovereignty. The reign, neverthelefs, was paſſed in perpetual hoſtilities, though carried on with little vigour on either ſide. John died in 1656, leaving behind him two ſons and two daughters. His reign, though far from brilliant, was uſeful; he was ever deſirous of promoting the good of his people, and very unwillingly impoſed any burthens on them. He recovered from the Dutch, and ſecured the valuable ſettlement of the Brazils, but loſt the iſland of Ceylon.

JOHN V., king of Portugal, born in 1689, ſucceeded his father Peter II., in December 1706. The nation was at this time engaged in the Spaniſh ſucceſſion war, as one of the allies againſt the houſe of Bourbon; the new king was faithful to the cauſe, but little either of ſucceſs or honour attended his arms. The peace of Utrecht was favourable to Portugal, and from that time the king's attention was occupied in rendering his country flouriſhing. His government was wiſe and moderate, his character generous and patriotic. He died in 1750. For farther particulars relating to the kings of Portugal, the reader is referred to the Modern Univerſal Hiſtory.

JOHN, king of Denmark, born in 1455, ſucceeded his father Chriſtiern I. in 1481. He had been acknowledged king of Denmark and Norway in his father's life-time. He expected to have been choſen king of Sweden, but was diſappointed by the intrigues of the adminiſtrator of that kingdom, and it was not till 1497 that he was crowned the king. At the coronation-feaſt, one of the king's German officers hinting that it would be a politic act to cut off the heads of thoſe who had been leaders in the oppoſition to him, John replied with a manly indignation, that he would rather ſee all his evil counſellors on a gibbet than incur the ſhame and infamy of ſo ſavage a deed. "God forbid," ſaid the virtuous monarch, "that I ſhould ever deny to any free people the right of chuſing their own governors." For ſome time he acted conformably to this ſentiment, and exhibited a mind intent upon the public good, which produced a general ſatisfaction with his government. John, however, did not always act upon the principle of equity, which the maxim above quoted ſhould have inculcated. The people of Dithmarſh accordingly vindicated, at the point of the ſword, their independence; and their ſucceſs was the forerunner of an open revolt in Sweden, where diſcontents had been gradually accumulating againſt the king's adminiſtration, owing to the facility with which he had conferred offices and grants on his favourites, to the prejudice of the natives. The former regent headed the malcontents, and renounced his allegiance to John. The queen, Chriſtina, who was left at Stockholm, was obliged to capitulate; and a revolution was effected in 1502. After this many changes in the government took place, ſeveral of which led John to hope for a reſtoration to the crown; and a treaty for that purpoſe was concluded a ſhort time before his death, which happened in February 1513, in conſequence of a fall from his horſe. He poſſeſſed many eſtimable qualities, and would have been a really good king, but that he ſuffered himſelf to be ſwayed too much by his favourites.

JOHN III. king of Sweden, born in 1537, was ſecond ſon of Guſtavus Vaſa, who ſettled upon him the dukedom of Finland. In 1560 he was ſent to the court of England to forward the propoſed union between his elder brother Eric and queen Elizabeth. Not long after this Eric ſucceeded to the crown, and John became the object of his ſuſpicion. He was arreſted, brought to trial, and condemned; but his life was ſpared, and the ſentence exchanged for perpetual impriſonment. Several times it was determined to deſtroy him, but the tyrant as often relented, till at length, finding it neceſſary to ſtrengthen his government, he liberated John in 1567, to the great joy of the Swediſh nation. In the following year he took up arms againſt Eric, whom he depoſed, and aſcended the throne in his ſtead. He found the nation involved in a war with Denmark and Ruſſia, and almoſt ſtruggling for its exiſtence. He concluded peace with the former power, but hoſtilities continued with the latter till they were ſuſpended by a truce in 1573. By the influence of the queen, John abjured the Proteſtant religion, and embraced that of the church of Rome. In conſequence of this dereliction of principle he made many enemies; and although numbers of the clergy were gained over by views of ambition and emolument, yet a formidable party, attached to the reformation, with the king's brother, Charles, duke of Sudermania, at their head, made ſuch an oppoſition as nearly to involve the kingdom in a civil war. By the death of the queen, John found it expedient to leſſen his zeal with regard to the eſtabliſhment of the Roman religion, though he retained the deſire of making it the religion of the ſtate. He accordingly publiſhed a liturgy conformable to it, the uſe of which he enjoined to the clergy under the ſevereſt penalties. The flame of religious diſcord was hereby re-kindled; and the duke Charles again ſtood forth as the defender of the Proteſtant church. In 1590 John married Chriſtina, daughter of the duke of Holſtein. The war with Ruſſia was renewed, and Sweden loſt ſeveral fortreſſes. In this ſtate of affairs John died in 1592, after a reign of 24 years. Mod. Univ. Hiſt.

JOHN SOBIESKY, king of Poland, born in 1624, was ſon of a brave and able ſtateſman of the ſame name. He received a very liberal education, and viſited the politeſt courts in Europe. He aſcended, through the ſeveral gradations, to the higheſt poſt in the army, and ſignalized himſelf in many important actions. In the battle of Choczim, in 1673, after three days fighting, he gave the Turks a total and bloody defeat. In the following year, after many difficulties, and ſtruggling through much oppoſition, he ſucceeded to the crown of Poland, and immediately applied his reſources in the proſecution of the Turkiſh war, and by a ſeries of brilliant ſucceſſes ſoon induced the Porte to agree to a treaty, which completely revoked the diſhonourable terms of a former one. His coronation followed the reſtoration of peace, and he employed the interval of tranquillity in the re-eſtabliſhment of the finances of the kingdom, and in preparations for a future war, which his own martial diſpoſition rendered no diſtant event. In 1683, he made an alliance, offenſive and defenſive, with the court of Vienna, and without heſitation expended the treaſures which he had accumulated in levying troops, and putting his army into the beſt poſſible ſtate. The Turks having laid ſiege to Vienna, and reduced it to great ſtraits, he marched to its relief. Forming a junction with the imperial general, the duke of Lorraine, they attacked the Turkiſh camp on September 11th, 1683, entirely routed the Grand Viſir, took poſſeſſion of all his cannon, warlike-ſtores, &c. and broke up the ſiege. The people of Vienna regarded John as their ſaviour, and all Europe has rendered him the homage due to his heroiſm on this important occaſion; but the pride of the emperor Leopold produced from him a cold and ungracious acknowledgment of the ſervice. Between this and the year 1686 he performed many other noble deeds of valour; but from that period he paſſed life without glory, in projects for the advancement of his family by alliances, and eſpecially for ſecuring the crown to his ſon, by which he was involved in many domeſtic inquietudes, and civil diſſentions. He died in 1696, leſs regretted than might have been expected; but he had been accuſed, in his latter years, of conſulting the intereſts of his own power and ambition, rather than thoſe of his country. It was, however, univerſally admitted that he was not only a brave warrior and conſummate commander, but poſſeſſed all the accompliſhments that are fitted to adorn a throne. As a literary man, he was eloquent and well informed on moſt ſubjects. He was a good Latin ſcholar, converſant in ſeveral modern languages, and acquainted with ſcience beyond moſt of his countrymen. Mod. Univ. Hiſt.

John *of Gaunt*, or *Ghent*, duke of Lancaſter, was the third ſon of Edward III. king of England, and born at Ghent in 1340. He married Conſtance, a natural daughter of Peter the Cruel, king of Caſtile and Leon; and on the death of that monarch he laid claim to the throne in right of his wife, in oppoſition to Henry of Tranſtamare, but without ſucceſs. He ſerved with conſiderable glory in France with his brother the Black Prince, and on his death the management of public affairs was committed to the care of John during the life of his father. On the acceſſion of Richard II. he retired; but the envy of the courtiers, particularly the eccleſiaſtics, who hated him for protecting Wickliffe, followed him with falſe accuſations of a deſign to uſurp the throne, from which, however, he ſatisfactorily vindicated himſelf. In 1386 his only daughter was married to the heir apparent of the king of Caſtile, and John renounced his claim to that crown in conſideration of a very large ſum of money and penſion. John took for his third wife Catherine Swinford, ſiſter to the wife of his friend Chaucer the poet. He died in 1399, leaving a high character for valour, prudence, and generoſity. His ſon afterwards became king, under the title of Henry IV. See Hume's Hiſt. and Godwin's Life of Chaucer.

John *of Auſtria, Don*, the natural ſon of the emperor Charles V. was born at Ratiſbon in 1547. He firſt appeared as a public character in 1569, during the revolt of the Moors of Granada, when he was appointed captain-general of the Spaniſh galleys, and was ſent to Carthagena to take the command. He aſſiſted in the operations of the war, which was brought to a happy termination the following year. The holy league againſt the Turks for the protection of the Venetians, being formed between the king of Spain, the pope, and the Italian ſtates, don John was nominated, in 1571, general in chief, and aſſembled the united fleet at Corfu. In October he engaged with the Turkiſh fleet in the gulph of Lepanto, and obtained that victory which ſtands conſpicuous in the ſeries of actions between the Chriſtian and Mahometan powers. Don John, in perſon, fought with and took the Turkiſh admiral's galley, and the battle terminated in the loſs, on the part of the Turks, of 130 galleys taken, 55 deſtroyed, 25,000 men killed, and 10,000 made priſoners, beſides achieving the liberty of 15,000 Chriſtian ſlaves. Diviſions aroſe as to the future operations of the war: the advice of John was over-ruled, and the advantages obtained by this ſplendid victory by no means equalled the public expectation. In 1576 he was appointed governor of the Low Countries. The Catholic provinces had united with Holland and Zealand againſt the Spaniards, and don John was directed openly to concur in this convention, and cauſe the Spaniſh troops to leave the country. Shortly after this don John took poſſeſſion of Namur, Charlemont, and Marienburg, contrary to the intereſts of the ſtates, who, in 1577, reſumed their arms, depoſed don John, and declared the archduke Matthias their governor. A war commenced, and John gave the army of the Netherlands a very ſignal defeat, and made himſelf maſter of many ſtrong places. He was proceeding in his military career, when, in October 1578, he was taken off, after a ſhort illneſs, in his camp at Namur, in the 32d year of his age. He reſembled his father in perſon, whom he equalled in activity and enterpriſe, and whom he greatly ſurpaſſed in generoſity and humanity.

John I. pope, was a native of Tuſcany, and aſcended the papal chair on the death of Hormiſdas, in the year 523. His pontificate was ſhort and wretched, owing to the intemperate zeal of the emperor Juſtin for the extirpation of all the ſects who would not conform to the Catholic faith: he even attempted to extirpate the Arians, of which party Theodoric, king of the Goths, avowed himſelf a defender. This prince wrote to the emperor moſt preſſing letters in favour of his perſecuted ſubjects, and when he found that no regard was paid to theſe, knowing the influence which the pope had at the imperial court, he ordered John to attend him at Ravenna: from thence he went in quality of ambaſſador to Conſtantinople, where he was very honourably received, but the main object of his embaſſy was conducted in a way which gave his employer very little ſatisfaction; and on his return Theodoric cauſed him to be conducted from the palace to a priſon. He died in confinement in the year 526, after a pontificate of little more than two years and a half.

John II. was elevated to the papal throne in 533, upon the death of pope Boniface II. In the following year the diſpute, "whether one of the perſons of the Trinity ſuffered in the fleſh," was carried on with great bitterneſs. In this diſpute the emperor Juſtinian took a part; he not only maintained the affirmative ſide of the queſtion, but declared all thoſe who diſſented from him to be heretics. He alſo wrote to John, ſending him his own creed, aſſuring him that it was the faith of the whole eaſtern church, and intreated him to pronounce a judgment in its favour. The emperor's letter was accompanied with rich preſents, and the pope, without much heſitation, decided in favour of Juſtinian's confeſſion. He died in 535, after a pontificate of two years and five months. Six letters bear his name in the Collect. Concil. of which the firſt is generally rejected as ſpurious.

John III. pope, ſurnamed *Cataline*, a native of Rome, was ſon of Anaſtaſius, a perſon of conſiderable diſtinction. He was elevated to the popedom on the death of Pelagius in 560, and after holding it about thirteen years he died.

John IV. pope, ſurnamed *Scholaſticus*, was elected to the pontifical dignity upon the death of pope Severinus, in the year 640. He engaged deeply in the controverſy of the MONOTHELITES (which ſee), and involved himſelf in ſome difficulties on that account. He employed the wealth of the church in humanely redeeming vaſt numbers of Chriſtians, whom the Sclavi had carried off captives in their irruptions into the empire during the reign of Heraclius. The reign of this pontiff did not extend to a ſingle year. Three of his letters are inſerted in the fifth volume of the Collect. Concil.

John V. pope, a native of Antioch in Syria, was, while only a deacon in the church, appointed by pope Agatho one of three legates, whom he choſe to be his repreſentatives at the ſixth general council, and it was by him that the Greek copy of the letters of Honorius to Sergius, produced and read in the council, was compared, and found entirely to agree with the Latin original, depoſited in the library of the patriarch. In 685, upon the death of Benedict II., John was elected his ſucceſſor, an honour which he retained ſomething more than a year. He died, after a long and tedious illneſs, in the year 686.

John VI. pope, was elected to the papal throne in the year 702: the reigning emperor, Tiberius Apſimarus, objected to the election, and ordered him to be driven from the apoſtolic ſee: but the ſoldiers took part with John, and eſtabliſhed him on his throne. He diſplayed great generoſity by redeeming many captives, whom the duke of Benevento had taken in an irruption into the territories of the empire of Italy, and at length prevailed upon that prince to put an end to his hoſtilities againſt the ſubjects of the empire. He held a council at Rome, in which Wilfrid, who had been driven from the ſee of York, and baniſhed England, was declared innocent of the crimes laid to his charge. John died in 705, after a reign of little more than three years.

John VII. pope, was raiſed to the pontifical dignity on the death of John VI. Immediately on his elevation to the throne, the emperor Juſtinian demanded of him his opinion with regard to certain canons; but John was too wary to be thus drawn into a trap, and declined giving any judgment, leſt, by ſo doing, he might incur the emperor's diſpleaſure. He died after a pontificate of two years and ſeven months, in the year 707. A ſingle letter of this pope is to be found in the ſixth volume of the Collect. Concil.

John VIII. pope, was, on the death of Adrian II., elected to fill the papal ſee. This was in the year 872; and in the following year the emperor Lewis II. came to Rome, where he held an aſſembly of the ſtates of Italy ſubject to his empire, at which the pope aſſiſted. In that aſſembly the pope abſolved Lewis from an oath which he had taken not to interfere with the government of the dukedom of Benevento, under the pretence that it had been extorted by force, and alſo that it was inconſiſtent with the welfare of the empire. In 875 he crowned the emperor Charles the Bald, and three years after went to France, where he held a council at Troyes. In his pontificate Italy was greatly ravaged by the Saracens, who obliged the pope to pay tribute. He correſponded with Photius, patriarch of Conſtantinople, who had driven Ignatius from his ſeat, and uſurped for himſelf the dignity. At firſt the pope refuſed to acknowledge him; but Photius, by rich preſents, rendered his holineſs propitious, who not only conſented to abſolve him from the excommunications which had been repeatedly thundered out againſt him, but readily received him as his brother and colleague. In a council held at Conſtantinople, in the year 879, at which the papal legates and Photius conjointly preſided, the latter was declared lawful patriarch of the imperial city, and the legates, won over by his preſents, ventured ſo far to depart from their inſtructions, that they pronounced an anathema againſt all who ſhould receive any of the councils which had condemned him. Upon their return to Rome, conſcious of having gone beyond their inſtructions, they endeavoured to conceal this circumſtance from the pope; but he was ſoon appriſed of it, and exaſperated, as well at their treachery, as at the diſingenuity of Photius, declared all their proceedings null and void, and aſſembled another council in 881, at which he cauſed the patriarch to be a ſecond time condemned. After this he made an offer of the imperial crown to Charles the Groſs, and urged him by all means to come to Rome to receive it. As ſoon as the ſtate of his affairs would permit him, Charles proceeded to that city, and was crowned by the pope in St. Peter's church. John, however, could not prevail with the new emperor to lend him any aſſiſtance againſt the Saracens; he, therefore, endeavoured to gain over ſuch of the Italian princes as had entered into an alliance with them. He even went to Naples, to try whether he could perſuade Athanaſius to turn his arms againſt them. That prelate promiſed to ſupport the pope, and was ſupplied with money to enable him to levy the requiſite forces, but with the cooleſt treachery he turned thoſe forces againſt the pope himſelf. John inſtantly excommunicated him, and refuſed him abſolution but upon ſuch conditions as he could not comply with. This pope died in the year 882, after a pontificate of little more than ten years. More than three hundred of his letters are to be found in the ninth volume of the Collect. Concil. ſome of which are ſaid to throw conſiderable light on the eccleſiaſtical and civil affairs of the time in which he flouriſhed. He left alſo a ſermon pronounced in council on the confirmation of the election of Charles the Bald.

John IX. pope, a native and deacon of Tivoli, was raiſed to the papal dignity on the death of Theodore II. in 898. At this period Italy was divided by the factions of different pretenders to the empire: John at firſt refuſed to take any part in theſe conteſts; but owing to the violence of Berenger, king of Lombardy, he was induced, apparently, to eſpouſe his cauſe, and to crown him emperor. He had, however, no ſooner left the city, than the pope aſſembled a council, in which he declared the coronation of Berenger null and void, as having been extorted by force, and acknowledged Lambert, who had alſo been crowned king of Italy, as the only lawful emperor. In the ſame year John convened a council to meet at Ravenna, which confirmed the acts of the council of Rome, and approved of the coronation of Lambert, who was preſent in perſon. This pope died in the year 900, after having filled the papal chair about two years. Four of his letters are extant in the ninth volume of the Collect. Concil.

John X. pope, roſe in the church by degrees, from the rank of deacon to that of archbiſhop of Ravenna. He was indebted, for this laſt promotion, to a celebrated proſtitute Theodora, with whom he had long been intimate notwithſtanding his elevated ſtation in the church. In 914, Theodora, by her intrigues and intereſt, got her favourite and friend preferred to the pontifical chair. Under this pope, Rome and Italy were indebted for deliverance from the barbarous and oppreſſive Saracens In 916 he crowned anew Berenger, who readily aſſiſted him in his ambitious projects. The pope reſolved to take the field himſelf as generaliſſimo of all the forces, and under him the Saracen power was completely annihilated, which, during the ſpace of forty years, had been the terror of the whole of Italy. In the following year the pope began to feel ſome compunctions of conſcience on account of his former conduct, and accordingly ſent a legate, as his proxy, on a pilgrimage to the tomb of St. James, of Compoſtella, in the kingdom of Leon, hoping, at leaſt wiſhing, others to believe, that he ſhould atone for his vices by offering rich preſents at the ſhrine of a departed ſaint. In the year 925 John ſhewed how little regard he paid to the canons of the church by confirming the nomination of Hugh, a child only five years old, and ſon of count Herbert, in the archbiſhopric of Rheims. As John was indebted for his rank and elevation in the church to the intrigues of one infamous woman, ſo he loſt his dignity and life through thoſe of another. This was Marozia, the daughter of his former miſtreſs Theodora. Marozia, exaſperated that ſhe did not ſucceed her mother in the confidence of the pope, reſolved to deſtroy him and his brother Peter, who at this time was in habits of the ſtricteſt intimacy with him. She communicated the bloody deſign to her huſband, and prevailed on him not only to approve, but to be the inſtrument of carrying it into execution. Accordingly this wretch, on a certain day, when the pope and his brother were together in the Lateran palace, broke into it at the head of a band of ruffians, killed Peter before his brother's face, and then, ſeizing the pope, dragged him to priſon, where he ſoon afterwards died. This tragical event happened in the year 928, after John had been ſeated on the papal throne more than fourteen years. Three of the letters of this pope are to be found in the ninth volume of the Collect. Concil.

John XI. pope, was ſuppoſed to be the natural ſon of pope Sergius III. by the infamous Marozia, but according to others he was the ſon of Alberic, duke of Spoletta. It is certain he attained the dignity of pope through the influence of Marozia, and her huſband Guy, marquis of Tuſcany, in the year 931, upon the death of Stephen VII. Guy did not long ſurvive the promotion of John, and immediately upon his death, Marozia ſent word to his brother Hugh, king of Lombardy, that ſhe would make him maſter of Rome, upon the condition of marrying her. To this the prince readily acceded, and took poſſeſſion of his bride, and the caſtle of St. Angelo at the ſame time. Hugh rendered himſelf hateful to the Romans, and excited the reſentment of Alberic, a ſon of Marozia by her firſt huſband, who put himſelf at the head of the diſcontented, attacked the caſtle of St. Angelo, and made himſelf maſter of the fortreſs. In the confuſion Hugh made his eſcape, but Marozia and pope John fell into Alberic's hands, who kept them both in cloſe confinement during the remainder of their lives. John died in 936, after a pontificate of nearly five years.

John XII. pope, whoſe original name was Octavian, was ſon of the Alberic referred to in the laſt article. On the death of his father in 954, Octavian ſucceeded to his dignities, and not ſatisfied with his temporal power, he aſpired to the papal throne when it became vacant in the year 956, and ſecured the poſſeſſion of it to himſelf. On this occaſion he aſſumed the name of John XII. and thus introduced the cuſtom which was afterwards adopted by his ſucceſſors of changing their uſual names for others, upon their acceſſion to the pontificate. At this time Berenger tyrannized over Italy, and the pope implored the aſſiſtance of Otho I., who delivered the country. John crowned Otho at Rome, and promiſed him fidelity, which however was of very ſhort duration, for he united with the ſon of Berenger againſt his deliverer. Otho returned to Rome in 963, and called a council, in which the pope was accuſed of adultery, ſacrilege, and other crimes, which were ſatisfactorily proved againſt him, and he was depoſed. When the ſentence of his depoſition had been pronounced, the council, clergy, nobility, and people, unanimouſly elected Leo VIII. to fill his place. After this, John ſeveral times conſpired againſt the life of the new pope, and was as frequently pardoned, till at length he contrived to ſet himſelf again on the papal throne. John inſtantly aſſembled a council of prelates and cardinals, who condemned the council that had depoſed him, and paſſed different ſentences of condemnation on all thoſe who had been acceſſary to the elevation of his rival. John did not long ſurvive the holding of this council, for having engaged in a criminal connection with a married woman, the injured huſband who caught him in the act put an end to his holineſs's life and debaucheries by ſome violent blows which he gave him on his temples. His death is ſuppoſed to have taken place in 964, after he had filled the papal throne about eight years. A ſingle letter of his is inſerted in the ninth vol. of the Collect. Concil.

John XIII. pope, was one of the principal accuſers of the pope whoſe hiſtory has been juſt given. By the part which he took on this occaſion, he recommended himſelf to the favour of the emperor Otho, who, after the death of John, returned with his army to Rome, and held a council there, in which a decree was paſſed, conferring on the emperor and his ſucceſſors for ever the power of nominating the pope, and of granting inveſtiture to biſhops. After the death of Leo VIII., in the year 965, John was recommended by the emperor as his ſucceſſor to the holy ſee, which was decidedly contrary to the inclination of the Roman people, who conſpired againſt him and drove him from his throne. The emperor determined to take ample revenge for this inſult, and marching his army, he reſtored the pope, and ſeverely puniſhed thoſe who had taken part againſt him. He next went to Ravenna, accompanied by the pope, where he held a council in the year 967. Upon the breaking up of the council the pope returned to Rome, where he ſpent the remainder of his life in the unmoleſted poſſeſſion of his high dignity. In 968 he crowned, in St. Peter's church, the young Otho, king of Germany, whom his father had taken for his partner in the empire, and in the year 971 he crowned as empreſs Theophania, daughter of the late eaſtern emperor Romanus, who was married to Otho the younger. John died at Rome in 972, after having preſided in the Roman ſee nearly ſeven years. In his pontificate the Poles were firſt converted to the Chriſtian religion, and he is ſaid by ſome writers to have been the perſon who introduced the practice of bleſſing or conſecrating church bells. Four letters of this pope may be found in the ninth vol. of the Collect. Concil.

John XIV. pope, ſucceeded to the papal chair on the death of Benedict VII. in the year 985, an honour which he enjoyed but eight months. Boniface VII. who is claſſed among the anti-popes, undertook the expulſion of John. He prevailed, ſeized his rival, confined him in the caſtle of St. Angelo, and there either ſtarved him to death, or more humanely diſpatched him with poiſon. Boniface himſelf did not long ſurvive the victim of his cruelty, being carried off in the ſame year by a ſudden death. Upon this event, John, a native of Rome, and the ſon of one Robert, was elected pope, and governed the church during the ſpace of about four months, but for ſome cauſe or other, not ſufficiently explained, he is not reckoned among the popes.

JOHN XV. was elected to the papal dignity in the year 985, on the death of John, the ſon of Robert, who has been juſt mentioned. Soon after the commencement of his pontificate, Creſcentius, a man of great power at Rome, aſpired at the ſovereignty of the city, ſeized the caſtle of St. Angelo, and aſſumed the title of conſul. The pope, conceiving that he was in danger, implored the aſſiſtance of the emperor Otho III., who promiſed him, that, if neceſſary, he would come with his whole army, and ſupport the apoſtolic ſee with the ſame zeal which his father and grandfather had diſplayed. John informed Creſcentius of the imperial determination; he ſubmitted, and ſent ſome of the chiefs of his party to invite his holineſs back to Rome, with the ſtrongeſt aſſurances of ſafety, and of that reſpect which was due to the ſucceſſor of St. Peter. John complied, and was permitted to live unmoleſted till towards the cloſe of his pontificate. In the year 993, at a council held at the Lateran palace, the pope, after hearing read an account of the life and ſuppoſed miracles of Ulderic, biſhop of Auguſta, declared, with the approbation of his biſhops, that from thenceforth Ulderic might be worſhipped and invoked as a ſaint in heaven reigning with Chriſt. This is the firſt inſtance on record of the ſolemn canonization of a pretendedly meritorious character, a practice which ſoon contributed to crowd the Roman calendar with ſaints, and loaded the church with wealth, by the rich offerings with which the ſuperſtitious multitude was encouraged to propitiate the favour of thoſe new mediators between God and man. About this period the pope became engaged in a quarrel with the French clergy, over whom he obtained a complete victory; he had, however, more trouble with Creſcentius who began to reſume his ambitious projects at Rome. John applied again for aſſiſtance to Otho, who marched an army to his aſſiſtance, but in the midſt of theſe warlike preparations the pope died in the year 996, and in the eleventh year of his pontificate. Three of his letters are extant in the ninth vol. of the Collect. Concil.

JOHN XVI. pope, was a native of Roſſano, in Calabria, of mean extraction, but a perſon of conſiderable abilities and addreſs. He was employed by the emperors Otho II. and III. in affairs of conſiderable moment; from the latter he obtained poſſeſſion of the ſee of Placentia, and held it till he heard that Gregory V. was driven from Rome by Creſcentius in the year 997, when he bargained for, and purchaſed the popedom of that uſurper, and then aſſumed the title of John XVI. He was excommunicated by ſeveral councils held in Italy, France, and Germany, and at length the emperor Otho brought againſt him a powerful army. The pope, or, as he is ſometimes called, the antipope, endeavoured to make his eſcape from the city, but falling into the hands of ſome of Gregory's friends, they barbarouſly deprived him of his ſight, and cut off his noſe and ears. To complete the climax of their cruelty, they mounted the unhappy wretch on an aſs, led him through the ſtreets of the city, and forced him to exclaim "Whoever ſhall dare to diſpoſſeſs a pope, let him be ſerved like me."

JOHN XVII. pope, was elected to the holy office on the death of Silveſter II. in the year 1003, in which year he alſo died, after he had preſided over the church about five months. It has been aſſerted, that from this time, the people were deprived of voting at elections of the ſovereign pontiffs, which was afterwards confined to the clergy. He was ſucceeded by

JOHN XVIII. pope, who held the office to which he was elected in 1003, between five and ſix years, but few of his acts have come down to us, except his ſending St. Bruno to preach Chriſtianity to the Ruſſians, and his putting an end to the ſchiſm which exiſted between the eaſtern and weſtern churches.

JOHN XIX. pope, was ſon of Gregory, count of Tuſculum, and brother of Benedict VIII. Upon the death of the latter in the year 1024, the influence and wealth of Gregory procured the election of his other ſon, who was then a layman. It was at this moment that he thought it adviſable to aſſume the name of John XIX. Early in this pontificate an attempt was made, by the emperor Baſilius, to allow the patriarch of Conſtantinople the title of Univerſal biſhop of the Eaſt, but John ſent back the ambaſſadors with a refuſal, telling them that the title of univerſal biſhop became none but the ſucceſſors of St. Peter in the apoſtolic ſee. In the year 1026, Conrad, king of Germany, having entered Italy with an army, and having reduced all the towns which had ſhaken off the imperial yoke, went to Rome, where the pope crowned him emperor, and his queen empreſs, with the uſual ſolemnities. On this occaſion, Rudolph, king of Burgundy, and Canute, king of England, who were on a pilgrimage to Rome, were preſent. John died in 1033. Three of his letters are inſerted in the ninth volume of the Collect. Concil.

JOHN XX. or XXI. pope, a Portugueſe, ſon of one Julian, a phyſician, became eminent for his acquaintance with the ſciences, particularly with that of medicine, the practice of which he followed for ſome time with great reputation. He afterwards devoted himſelf to the church, and advanced by degrees to high preferment. He was made cardinal by Gregory X., and on the death of Adrian V., in 1276, he was elected to the pontifical dignity, when he took the name of John XX. or XXI. The firſt act of his pontificate was to revoke the famous conſtitution of Gregory X. which ordered that the cardinals ſhould be ſhut up in the conclave during the vacancy of the papal ſee. He did all in his power to aſſiſt the Chriſtians in the Eaſt. He was ignorant of the world, and became attached to the pretended principles of judicial aſtrology; from theſe he thought he had many years to live, and began to deviſe ſchemes for the future. He was, however, carried off in eight months after his elevation to the holy ſee. He was author of ſeveral tracts on logic, one on phyſiognomy, and ſome medical treatiſes. One of his letters to Edward I. king of England, is in the tenth volume of the Collect. Concil. and ſome others in the ſecond volume of Widdingus' "Annal. Minor."

JOHN XXI. or XXII. pope, a Frenchman by nation, and by deſcent, according to different writers, the ſon of a noble, a tavern-keeper, or a cobler. In early life he was appointed to ſome conſiderable offices in the ſtate, the duties of which he performed with ſo much credit to himſelf, as to manifeſt very ſuperior talents for public buſineſs. On the death of Clement V., in 1314, the moſt violent diſputes occurred in the election of a ſucceſſor to the holy ſee. Theſe were carried on for two years, after which the cardinals unanimouſly elected James de Oſſa, the ſubject of this article, who aſſumed the name of John XXI. or XXII. During his pontificate he founded ſeveral abbeys and biſhoprics; but he was not only the witneſs to, but the perpetrator of, many cruelties with reſpect to the Franciſcans; ſome of whom were, by his order, actually flayed alive, as preparatory to their being bound to the ſtake for burning, which ſavage ſentence was carried into execution without mercy. The cruelty of John was condemned by his warmeſt adherents, who did not ſcruple to declare that by it he had rendered himſelf utterly unworthy of the papal dignity, and that his deeds proved him to be the predicted anti-chriſt. They even revered theſe victims as martyrs to the truth, paying religious veneration to their bones and aſhes. He was next involved in the diſpute whether Chriſt and his apoſtles ever poſſeſſed any property or dominion, either in common or perſonally. The diſcuſſions on this queſtion were violent and bitter, and thoſe who maintained the negative ſide of the queſtion paid for their temerity by the moſt excruciating ſufferings inflicted on them. John was now engaged in a diſpute with Lewis of Bavaria, who, as the reward of his victory over Frederic of Auſtria, claimed the Imperial crown as his right. John, alarmed at his aſſurance, inſtantly excommunicated him, and forbade all the ſubjects of the empire, on penalty of the ſame ſentence, to acknowledge him for king, or obey him as ſuch. From this ſentence the monarch appealed to a general council, and publiſhed a manifeſto againſt his holineſs, deſcribing him as one who trampled on all laws, human and divine, to gratify his ambition or avarice; as a ravenous wolf, fleecing and devouring the flock committed to his care; and, as an avowed heretic, in condemning as hereſy the doctrine concerning the poverty of Chriſt. John died after a moſt turbulent pontificate, in the year 1334, at the great age of ninety years. Notwithſtanding his various acts, which have been but merely referred to, he found biographers to praiſe his good deeds, forgetting thoſe which were of a contrary deſcription. They ſaid he was a man of learning, and an encourager of the learned. The hiſtorian has held him up as ambitious, arrogant, cruel, and avaricious. He is ſuppoſed to have been the perſon who invented the "Annates," obliging every clergyman, preferred to a benefice, to pay into the apoſtolic chamber one year's income before he took poſſeſſion of it. He died immenſely rich, and was known in the literary world as author of ſeveral treatiſes: one "On the Contempt of the World:" one "On the Tranſmutation of Metals," and twenty-two Conſtitutions which he ordered to be called "Extravagantes." Many of his bulls and letters are likewiſe extant. He is ſaid alſo to have been author of ſeveral treatiſes on medicine, which led ſome of his biographers to ſay he was better fitted for a phyſician than a pope. He is ſaid by Walther to have written, among other things, a treatiſe on muſic, Eine Muſicam; but no ſuch treatiſe is enumerated in the liſt of his works by Baronius or Fabricius. This pontiff, however, ſeems to have intereſted himſelf very much about eccleſiaſtical muſic. The attempts at diſcant, or extemporaneous counterpoint, were thought ſo licentious in his time, that he prohibited the uſe of it in the church by a bull in 1322. There is, however, at the end of it this favourable clauſe: "It is not our intention wholly to prevent the uſe of concords in the ſacred ſervice, particularly on great feſtivals, provided the eccleſiaſtical chant or plain-ſong be carefully preſerved. The Abbé Lebœuf obſerves, that thoſe who drew up this bull, which is inſerted in the body of canon laws, erroneouſly confined diſcant to fourths, fifths, and eighths, from the peruſal of ancient authors on the ſubject of muſic, particularly Caſſiodorus, where they had found the following definition: "Symphonia eſt temperamentum ſonitus gravis ad acutum, vel acuti ad gravem, modulamen efficiens, ſive in voce, ſive in percuſſione, ſive in flatu. Symphoniæ ſunt ſex: prima, diateſſaron: ſecunda, diapente: tertia, diapaſon. Quarta, diapaſon et diateſſeron: quinta, diapaſon et diapente: ſexta, diapaſon et diapaſon."—"Symphony, or muſic in conſonance, is the mixing grave ſounds with acute, or acute with grave, either in ſinging or playing upon ſtringed or wind inſtruments. Symphonic concords are ſix: the fourth, fifth, and eighth, with their octaves. It is hardly poſſible to read this paſſage, and not give up the conteſt concerning ancient counterpoint, or at leaſt reduce it to the meagre kind of which Padre Martini has framed an example in his Storia Muſica.

John XXII. or XXIII. pope, formerly known by the name of Balthaſar-Coſſa, was a native of Naples, and being deſcended from a noble and wealthy family, he enjoyed the advantages of an excellent education at Bologna, where he took his degrees, and from thence he ſet out to Rome, anticipating the honours that ſeemed to be reſerved for him, for on being aſked by ſome of his friends whither he was going, he replied "to the popedom." Scarcely had he arrived at this great city, when he was made chamberlain to pope Boniface IX. who, in 1402, promoted him to the purple. He took an active part in the depoſition of Gregory XII. and exerted all his talents, influence, and property to ſecure the election of Alexander V. Soon after that pontiff's election the plague obliged him to quit Piſa, and he was prevailed upon by cardinal Coſſa to pay a viſit to Bologna. Here he found means to detain the pope, under various pretences, till his holineſs fell dangerouſly ill, and his complaints proved fatal to him. The ſubject of our preſent article has lain under the heavy charge of cauſing him to be poiſoned by his phyſicians: he was, however, elected his ſucceſſor, and from the title of cardinal Coſſa he aſſumed the name of John XXIII. On the very day that he was raiſed to this high dignity in the church, he wrote to all Chriſtian princes, acquainting them of his promotion, and exhorting them to ſupport his claims againſt the pretenſions of thoſe who had been condemned and depoſed by the church univerſal. One of the earlieſt objects of John's adminiſtration was to raiſe a fund to ſupport the claims of his friend Lewis of Anjou, in oppoſition to thoſe of his inveterate enemy, Ladiſlaus, to the poſſeſſion of the kingdom of Naples. In his progreſs he ſolemnly excommunicated Ladiſlaus, and then ordered a cruſade to be preached againſt him all over Chriſtendom. By the bull iſſued on this occaſion, all were exhorted to take the croſs and engage in this holy war; and to all who ſhould embark in it, the ſame indulgences were granted as to thoſe who went to the conqueſt of the Holy Land. In a ſhort time peace was reſtored; this was effected by John's taking off the excommunication from Ladiſlaus, who, in return, agreed to abandon the cauſe of Gregory, whom he had hitherto vindicated as the true pope. After the reſtoration of tranquillity, John made a promotion of fourteen cardinals, and ſummoned all the prelates of the church to attend a general council at Rome. At this council few biſhops were preſent, its proceedings were, probably, unimportant, except in this, that it condemned the doctrine of Wickliff, and ordered his works to be committed to the flames. Ladiſlaus took the firſt opportunity of attacking pope John: the pontiff appealed to all Chriſtian princes, exhorting them to appoint a general council to put a ſtop to the reigning evils, and to unite the whole church under one head. The choice of the place was left to the emperor, who fixed on Conſtance. Here the council was opened on the 1ſt of November 1414. After many ſeſſions a liſt of accuſations againſt the pope was read, containing ſeventy articles, ſome of which, however, were too ſcandalous even to be gone into: the others related to the pope's ſimony and tyranny; and to the means which he took of amaſſing immenſe riches. After theſe articles, and the depoſitions in ſupport of them, were read and examined, the council declared them to be fully proved, and then unanimouſly paſſed a ſentence of ſuſpenſion againſt the pope. This ſentence was communicated to him by a deputation from the council. After this, *viz.* on the 29th of May 1415, the council proceeded a ſtep farther, and unanimouſly paſſed the definitive ſentence of John's depoſition, and ordered his ſeals to be broken. He was then committed to the care of Lewis, duke of Bavaria, and count palatine of the Rhine, who kept him priſoner, but treated him with civility and reſpect. At the expiration of about four years he obtained his liberty, and made ſuch conceſſions to the exiſting pope Martin V. that he created him cardinal biſhop of Tuſculum, and dean of the ſacred college: he alſo ordained that he ſhould always ſit next to the pope, and that his ſeat ſhould be elevated a little above thoſe of the other cardinals. He did not live many months to enjoy theſe honours. His character has already been deſcribed: he was unqueſtionably vicious and deſtitute of good principles, and merited that fall which he experienced. He was author of a poem "De Varietate Fortunæ," which is ſaid to be diſtinguiſhed by genius and taſte. His bull for aſſembling the council of Conſtance; the form of his reſignation, and ſome of his letters, are ſtill extant. For farther particulars relating to the popes John, the reader is referred to Bower's Hiſtory.

JOHN *of Bayeux*, known alſo by the name of John of Avranches, an illuſtrious Gallican prelate in the eleventh century, the firſt of all the biſhops of Avranches, and afterwards promoted to the archiepiſcopal ſee of Rouen. He held a provincial council in the year 1074, at which ſeveral ſtatutes were paſſed for the regulation of eccleſiaſtical diſcipline, which provoked the reſentment of the lax and diſſipated clergy, who obliged him to ſeek for ſafety in flight. Other perſecutions obliged him to reſign his preferment, and retire to his country houſe: here he was attacked by the monks of the abbey of St. Owen, who killed him on the ſpot. He was author of a work "On the Duties of Eccleſiaſtics," which was firſt publiſhed with notes, by John le Prevot, canon of Rouen. Moreri.

JOHN DAMASCENUS, or St. John of Damaſcus, who lived in the eighth century, is celebrated by the writers of his life, and by eccleſiaſtical hiſtorians, as the compiler and reformer of chants in the Greek church, in the ſame manner as St. Gregory in the Roman. And Leo Allatius, under the title of *Octoëchus*, tells us they were compoſed by John Damaſcenus. Zarlino goes ſtill farther, and informs us that in the firſt ages of Chriſtianity the ancient Greek notation by letters having been thrown aſide, John Damaſcenus invented new characters, which he accommodated to the Greek eccleſiaſtical tones; and that theſe characters did not, like our's, merely expreſs ſingle ſounds, but all the intervals uſed in melody: as a ſemitone, tone, third minor, third major, &c. aſcending and deſcending with their different duration.

This reſembles, in many particulars, the notation in ancient Romiſh miſſals, before the time-table and characters in preſent uſe were invented, or even the Gregorian notes generally received.

JOHN DE MURIS. See MURIS.

JOHN *of Saliſbury*, a learned Engliſhman of the 12th century, was elected biſhop of Chartres in France in the year 1177, an office which he held about four years when he died. He wrote the life of Thomas á Becket and ſeveral other works. This learned prelate ſeems to have been much offended and ſcandalized at the licentiouſneſs of the ſingers in performing the ſacred rites. We ſhould ſuppoſe, by his cenſures, that the choral band was outrageouſly addicted to flouriſhing, and that many of them ſung in falſit. What the complaints of the good biſhop of Chartres were, the following paſſage from his Policraticus will ſhew.

"Muſica cultum religionis inceſtat, quod ante conſpectum Domini, in ipſis penetralibus ſanctuarii, laſcivientis vocis luxu, quadam oſtentatione ſui, muliebribus modis notularum articulorumque cæſuris, ſtupentes animulas emollire nituntur. Cum præcinentium, et ſuccinentium, canentium, et decinentium, intercinentium, et occinentium, præmelles modulationes audieris, Sirenarum concentus credas eſſe, non hominum, et de vocum facilitate miraberis, quibus philomela vel pſittacus, aut ſi quid ſonorius eſt, modos ſuos nequeunt coæquare. Ea ſiquidem eſt aſcendendi deſcendendique facilitas; ea ſectio vel geminatio notularum, ea replicatio articulorum, ſingulorumque conſolidatio; ſic acuta vel acutiſſima, gravibus et ſubgravibus temperantur, ut auribus ſui indicii fere ſubtrahatur autoritas." Policraticus, ſive de Nugis Curialium, lib. i. c. 6.

"The rites of religion," ſays he, "are now profaned by muſic: and it ſeems as if no other uſe were made of it than to corrupt the mind by wanton modulations, effeminate inflections, and frittered notes and periods, even in the *Penetralia*, or awful ſanctuary itſelf. The ſtupid crowd, delighted with all theſe vagaries, imagine they hear a concert of ſirens, in which the performers ſtrive to imitate the notes of nightingales and parrots, not thoſe of men; ſometimes deſcending to the bottom of the ſcale, ſometimes mounting to the ſummit; now ſoftening and now enforcing the tones, repeating paſſages, mixing in ſuch a manner the grave ſounds with the more grave, and the acute with the moſt acute, that the aſtoniſhed and bewildered ear is unable to diſtinguiſh one voice from another."

JOHN *of Raguſa*, a learned Catholic prelate, who flouriſhed in the fifteenth century, was born in the city whence he derived his ſurname. While young he entered himſelf among the preaching friars, and applied with ſuch diligence to his ſtudies, that he became one of the moſt learned men of his time. He was particularly celebrated for his deep acquaintance with the Oriental languages. In 1426 he was appointed attorney-general of his order at the court of Rome, and was nominated by pope Martin V. one of his divines at the council of Baſil. At this aſſembly he was the principal diſputant againſt the doctrines promulgated by John Huſs. After this he was ſent on different legations to Conſtantinople, with a deſign of bringing about an union between the eaſtern and weſtern churches, but his exertions were not attended with ſucceſs. On his return to Italy he was nominated to the ſee of Argos in the Peloponneſus. It has been aſſerted by ſome authors that he was made a cardinal. His works are "A Diſcourſe againſt the Huſſites:" Acts of his Legation to Conſtantinople:" and "An Account of his Travels in the Eaſt." Moreri.

JOHN, *Preſter*. See PRESTER.

St. JOHN's *Bread*, in *Botany*. See CERATONIA.

JOHN's *Sweet*. See PINK.

St. JOHN's *Wort*. See HYPERICUM.

St. JOHN's *Wort*, *Hypericum perforatum*, in the *Materia Medica*, a ſpecies of hypericum which grows, commonly to the height of a foot and a half, in woods and uncultivated grounds, and flowers in July. This plant has a bitteriſh, ſub-aſtringent taſte, and a ſweetiſh ſmell. Among the ancients it was in great repute; and they preſcribed it in hyſteria, hypochondriaſis, and mania: they alſo imagined that it had the peculiar power of curing demoniacs, and it thence obtained the name of "fuga dæmonum." It was alſo recommended internally for wounds, bruiſes, ulcers, hæmoptyſis, mictus cruentus, gravel, dyſentery, agues, worms; and outwardly as an anodyne, and as a diſcutient and detergent.

tergent. However, it is now very rarely uſed. The flowers only are directed for uſe, as containing the greateſt proportion of the reſinous oily matter, in which the medical efficacy of the plant is ſuppoſed to reſide. The dark puncta of the petals and the capſules afford this eſſential oil, which is contained in minute veſicles, or glands, and gives a red colour to rectified ſpirit, and to expreſſed oils: the latter has been long known in the ſhops by the name of "oleum hyperici." The colouring matter is ſaid to give a good dye to wool. Woodville's Med. Bot.

John's, *St.*, *College*, in America. See College.

John *de Frontera, St.*, in *Geography*. See Juan *de la Frontera*.

John's *Haven*, a ſmall ſea-port town in the pariſh of Benholme, and ſhire of Kincardine, Scotland, was formerly one of the moſt conſiderable fiſhing towns on the ſouthern coaſt of Scotland. At preſent, however, it is much reduced, its trade declined, and population diminiſhed. A company of ſail-cloth manufacturers have eſtabliſhed works here, and thus given employment to the inhabitants. The population of the pariſh, in the year 1793, was calculated at 1019. This place is 9 miles north of Montroſe.

John's *Iſlands*, iſlands of America, near the coaſt of South Carolina, S.W. of Charleſtown harbour, divided from James's iſland by the river Stono, which forms a convenient and ſafe port.

John's *Iſland*, an iſland in the bay of Quinta, Upper Canada, oppoſite the Mohawk ſettlement, weſt of Richmond.

John, *St.*, a town of the iſland of May, one of the cape Verd iſlands.—Alſo, one of the Virgin iſlands, in the Weſt Indies; 12 leagues E. of Porto Rico; about five miles long, and one broad; ſaid to be the beſt watered of all the Virgin iſles, though it has little good land, and its exportations are trifling. Its harbour, called "Crawl bay," is reckoned better than that of St. Thomas, and is accounted the beſt to the leeward of Antigua. N. lat. 18° 7'. W. long. 64° 32'.—Alſo, a ſea-port town well built, on the weſt coaſt of the iſland of Antigua. It is ſituated in a pariſh of the ſame name, on Loblolly bay. It is the capital of the iſland, and a port of entry. Its harbour is excellent and well fortified. This town is the reſidence of the governor-general of the leeward Charaibe iſlands; here the aſſembly is held; and its port carries on a great trade. This town was nearly deſtroyed by fire in Auguſt 1769; upwards of 260 houſes being conſumed, beſides wharfs, cranes, &c. N. lat. 17° 4'. W. long. 62° 4'.—Alſo, an iſland, called alſo *Prince* Edward's *Iſland* (which ſee), in the gulf of St. Lawrence, ſituated at a ſmall diſtance to the weſt of the iſland of Cape Breton, and to the north of Nova Scotia, to which it is attached. Its coaſts on the north and ſouth are much interſected with bays; it is well watered by rivers, and its ſoil is for the moſt part rich and fertile. It formerly belonged to the French, who improved it to ſuch advantage, that it was deemed the granary of Canada, which it ſupplied with plenty of corn, as well as beef and pork. On the conqueſt of Cape Breton in 1745, the inhabitants quietly ſubmitted to the Britiſh arms. Its capital is Charlotte's town, which is the reſidence of the lieutenant-governor, who is the chief officer in the iſland: its other towns are George town, Prince's town, Hillſborough town, Pownal town, Maryborough town, &c. Its length from N.E. to S.W. is reckoned about 100 (Pinkerton ſays 60) miles, and its mean breadth is 30 miles. The whole iſland is divided into three counties, *viz.* King's, Queen's, and Prince's counties, which are ſubdivided into 14 pariſhes, conſiſting of 27 townſhips, and comprehending in all 1,363,400 acres. The number of inhabitants is eſtimated at about 5000. N. lat. 46° 20'. W. long. 63°.—Alſo, a ſmall iſland in the Pacific ocean, eaſt of New Ireland, ſo called by Schouten, and by Bougainville Bournand. S. lat. 4°. E. long. 153° 50'.—Alſo, a ſmall iſland in the Red ſea.—Alſo, a ſmall iſland in the Weſt Indies, north of St. Croix, and ſouth of Tortola; noted for its fine harbour, which, it is ſaid, is ſufficient to contain the whole Britiſh navy.—Alſo, a bay and iſland on the weſt coaſt of Newfoundland, in the gulf of St. Lawrence, at the S.W. end of the ſtraits of Belleiſle.—Alſo, a town on the eaſt coaſt of Newfoundland. N. lat. 47° 35'. W. long. 52° 20'.—Alſo, a town of America, being the north-weſternmoſt in Suſſex county, Delaware, ſituated at the head of Nanticoke river, about 22 miles S.W. of Dover. N. lat. 38° 48'. W. long. 75° 40'.—Alſo, a town and fort in Lower Canada, on the weſt bank of Sorel river, at the north end of lake Champlain, 28 miles ſouth of Montreal. This town has been eſtabliſhed as the ſole port of entry and clearance for all goods imported from the interior of the United States into Canada, by the executive council of Lower Canada, in July 1796. N. lat. 45° 9'. W. long. 72° 18'.—Alſo, a ſea-port on the S.E. coaſt of the iſland of Tinos. N. lat. 37° 32'. E. long. 25° 15'.—Alſo, a river of America, in Eaſt Florida, which riſes in a ſwamp in the interior of the province, and purſues a northern courſe, in a broad navigable ſtream, ſpreading frequently into ſpacious bays or lakes, of which lake George is the chief. At its mouth is a ſhifting bar; 10½ leagues north of St. Auguſtine.—Alſo, a river, called Little St. John's, which riſes in a ſwamp called Ouaquephenogaw, and after a winding courſe of about 200 miles, falls into Apalache bay, about 10 miles eaſt of Apalache river. It is ſaid to be the pureſt and cleareſt of any in America, receiving, as the Indians ſay, no tributary ſtreams, but being fed by ſprings which guſh through its banks, and is about 200 yards broad, and about 15 or 20 feet deep at the town of Talahaſochete.—Alſo, a river which is the largeſt in the Britiſh province of New Brunſwick. From its mouth on the north ſide of the bay of Funchal to its main ſource it is computed to be 350 miles; the tide flows 80 or 90 miles up this river; and it is navigable for ſloops of 50 tons 60 miles, and for boats 200. Its general courſe from its origin is E.S.E. It is the common route to Quebec. It furniſhes the greateſt plenty of ſalmon, baſs, and ſturgeon. This river is fed by many tributary ſtreams, and in its various branches it waters and enriches a large tract of excellent country, which is ſettled and under improvement. The uplands are, in general, covered with fine timber, ſuch as pine and ſpruce, hemlock and hard wood, principally beech, birch, maple, and aſh. The pines on this river are the largeſt in Britiſh America, and afford a conſiderable ſupply of maſts for the Britiſh navy.—Alſo, a river of Africa, which runs into the Indian ſea, S. lat. 31° 20'; and another of Africa, which runs into the Atlantic, N. lat. 19° 20'.—Alſo, a lake in Lower Canada, which receives rivers almoſt in every direction, and diſcharges its waters through Saguenai river into the St. Lawrence, at Tadouſac. It is about 25 miles in diameter.

JOHNNY Groat's House, the moſt northerly dwelling of Scotland, in the county of Caithneſs; one mile W. of Duncanſby Head.

JOHNSBURY, a townſhip of America, in Caledonia county, Vermont, bounded S.W. by Danville; containing 663 inhabitants.

JOHNSON, John, in *Biography*, a learned divine of the church of England, was born at Friendſbury, near Rocheſter, in Kent, in the year 1662. He received the elements of a good education at King's ſchool, Canterbury, and from thence he was ſent, when he was about 15 years of age, to Magdalen college, Cambridge. Here he took his degrees and entered into deacon's orders, and ſhortly after obtained a curacy near Canterbury. In 1686, he was ordained prieſt, and collated by archbiſhop Sancroft to the vicarages of Bocton and Hearne-Hill. After the revolution he complied with the new order of things, and became an able advocate in its defence, which gained him the friendſhip and patronage of archbiſhop Tenniſon, from whom he received ſeveral inſtances of church preferment, and in 1707, was collated to the vicarage of Cranbrook. Here he ſeems to have completely abandoned his friends and his principles, and to have advanced from ſtep to ſtep till he even denied the king's ſupremacy, and refuſed to read the prayers enjoined on the acceſſion of George I. Notwithſtanding this dereliction of principle, he was twice choſen proctor in convocation for the dioceſe of Canterbury. He died in 1725, having been ſeveral times under proſecution, from the effects of which he was releaſed by ſubmiſſion to the higher powers: had his fortitude been equal to his zeal, he would have ſuffered in defence of the moſt arbitrary and indefenſible opinions, that can well be broached by a man of ſenſe. Johnſon was unqueſtionably a man of ſound learning; his morals were exemplary and his piety unaffected. He was diligent in the diſcharge of the ſeveral duties belonging to the paſtoral office, but his temper was bad, and during the latter years of his life, he ſhewed ſo much bigotry and intolerance againſt thoſe who thought as he himſelf had formerly thought, as detracted from the value of his good qualities. His principal works are "The Clergyman's Vade Mecum;" "A Collection of Eccleſiaſtical Laws, Canons, &c.;" "The unbloody Sacrifice and Altar unveiled and ſupported;" and "A Paraphraſe on the Pſalms in the Liturgy." After his death his ſurviving daughter publiſhed two volumes of his poſthumous ſermons and diſcourſes. Biog. Brit.

JOHNSON, SAMUEL, an Engliſh divine, was born in the year 1649, in the county of Stafford, though others have named Warwickſhire as his birth-place. He was educated at St. Paul's ſchool, London, whence he was removed to Trinity college, Cambridge. After he had taken orders, he was preſented to the rectory of Corringham, in the hundreds of Eſſex, but the place not agreeing with his health, he removed to London, and took an active part in the political diſcuſſions of the times. He was introduced to lord Ruſſell, who immediately made him his domeſtic chaplain. He now became a formidable writer in the cauſe of liberty, and was called on during the reign of Charles II. to bear his teſtimony to the truth by ſevere impriſonment. But his ſufferings were brought to the acme by a paper which he drew up in the year 1686, when the army was encamped upon Hounſlow Heath, entitled, "An humble and hearty Addreſs to all Engliſh Proteſtants in the preſent Army." For this he was brought to trial, and condemned to ſtand in the pillory at three places, to pay a fine of 500 marks, and to be publicly whipped from Newgate to Tyburn. Before they executed this ſavage ſentence they intended to degrade and deprive him of his orders, but fortunately for the ſufferer, the prelates Crew, Sprat, and White, too eager, probably, to perform the commands of the tyrant, forgot to ſtrip off his caſſock. This informality was fatal to their plans, and they found it impoſſible to take away his living. Notwithſtanding the laceration of his body, his heart was unbroken, and he continued to employ his pen in the ſame cauſe, till the revolution changed his ſituation. Parliament now declared that the proceedings againſt him were illegal, and the houſe of lords addreſſed king William to confer upon him ſome preferment. Johnſon was ambitious of a biſhopric, but he was offered a deanery; this he did not accept, but received a penſion of 300*l.* *per annum* during his own and his ſon's life, a preſent of 1000*l.*, and a place of 100*l.* *per annum* for his ſon. A tract, which he afterwards publiſhed, was the cauſe of ſo much perſonal violence as nearly to have coſt him his life: the piece was entitled "An Argument proving that the Abrogation of King James by the People of England from the Royal Throne, and the Promotion of the Prince of Orange in his ſtead, was according to the Conſtitution of the Engliſh Government, and preſcribed by it." It was, unqueſtionably, on account of this pamphlet that ſeven ruffians broke into his houſe early in the morning, aſſembled round his bed, gave him a wound on the head with a ſword, and otherwiſe ill-treated him. They threatened to take his life, but ſhrinking from ſo foul a deed, they left him wounded, and did no injury to his houſe or effects. Notwithſtanding his general attachment to the new government, he did not ſpare its defects; he complained grievouſly of the duration of parliaments, which he maintained ought to be continued for one year each only. On ſome occaſions his oppoſition was carried ſo far as to lead his beſt friends to ſuſpect he was about to abandon his original principles. He died in 1703, and his works were collected and printed in one volume folio. Biog. Brit.

JOHNSON, SAMUEL, a celebrated Engliſh writer, was born at Litchfield, in the year 1709, in which city his father carried on the bookſelling buſineſs on a very ſmall ſcale. He was educated partly at the free-ſchool of his native city, and partly at Stourbridge, in Worceſterſhire. He was probably intended for trade, but having acquired a reputation for learning, his father very willingly complied with the propoſal of Mr. Corbet, of maintaining Samuel at Oxford, as companion to his ſon. He accordingly was entered a commoner of Pembroke college, in the year 1728, when he was in the nineteenth year of his age. Johnſon was careleſs of his character with reſpect to the diſcipline and the ſtudies of the place, yet he obtained credit by ſome of his compoſitions, of which the moſt diſtinguiſhed was a tranſlation into Latin of Pope's Meſſiah, written with great ſpirit and vigour. He remained at Oxford but three years, during a part of which he had to ſtruggle with the griping hand of penury. Soon after his return home, his father died in very narrow circumſtances, and about this time it appears, from his own account, that he was firſt led to think in earneſt of religion, by the peruſal of Law's "Serious Call to the Unconverted." He engaged himſelf as uſher to the grammar ſchool of Market Boſworth, Leiceſterſhire, but the treatment which he met with at this place ill accorded with his feelings, and he quitted the ſchool, and paſſed ſome time with a friend at Birmingham. Here he wrote ſome literary eſſays, and tranſlated and abridged from the French the account of the voyage to Abyſſinia, by father Lobo. This was publiſhed without the tranſlator's name, at London, in 1735. Returning to Litchfield, he iſſued propoſals for publiſhing by ſubſcription, the Latin poem of Politian, but they did not meet with encouragement, and the deſign was abandoned. He now made a bold effort to improve his ſituation, married the widow of Mr. Porter, a mercer of Birmingham, and opened a ſchool. He had received 800*l.* with his lady, and depending on his own learning and powers, he took a large houſe, and advertiſed for ſcholars to be boarded and inſtructed in the Greek and Latin languages. His plan did not ſucceed; not more than three ſcholars offered, among theſe was the celebrated David Garrick. After a year's trial he abandoned his ſchool, and reſolved to become a literary adventurer in the metropolis. He accordingly ſet out, taking his ſcholar

Garrick as his companion, being furniſhed with recommendatory letters by Mr. Gilbert Walmſley, a gentleman who had been before the friend and benefactor of Johnſon. Johnſon and his friend arrived in London in March 1737; his firſt and principal engagement was with Cave, the proprietor of the Gentleman's Magazine, and at the deſire of this gentleman he undertook a tranſlation of Father Paul's Hiſtory of the Council of Trent, which was partly printed and then the ſcheme was given up. At this period Johnſon became acquainted with Savage, in whoſe misfortunes he ſympathized, and in whoſe company he was a ſpectator of the vices and diſorders of the metropolis, and probably a ſharer in the hardſhips which he endured, and in the irregularities which he committed, but whatever ſtain the morals of Johnſon might receive from this connection, it was obliterated by the permanent influence of the principles of piety and virtue. The literary piece which brought him into public notice, was entitled "London, a Poem;" written in imitation of Juvenal's Third Satire. For this he received of Dodſley the ſum of 10*l.* It was printed without any name, but it was ſaid by Pope, then in the height of his popularity, that the author of ſo good a ſatire could not remain long concealed. Johnſon, at this period, wanted ſomething more ſubſtantial than mere praiſe, and offered himſelf as a candidate for the maſterſhip of a free-ſchool in the country. This he was unable to attain, becauſe it was neceſſary that the maſter ſhould have taken his degree of M. A. This he had neglected to do while he was at Oxford, and now he had applied for the honour to the univerſity of Dublin, through the medium of lord Gower, who, in writing to his friend on the ſubject, ſays, "he is not afraid of the ſtricteſt examination, though he is of ſo long a journey; and yet he will venture it, if the dean (Swift) thinks it neceſſary, chooſing rather to die on the road, than to be ſtarved to death in tranſlating for the bookſellers, which has been his only ſubſiſtence for ſome time paſt." This application produced no effect, and he was obliged to content himſelf with the patronage of the London bookſellers, particularly with the employment which he obtained in the Gentleman's Magazine. In this work were given the parliamentary debates, under the fiction of "Debates in the Senate of Liliput," and the ſpeakers were diſguiſed under feigned names. Guthrie, for a time, compoſed theſe ſpeeches from ſuch hints as he could bring away in his memory. Johnſon firſt aſſiſted in this department, and then entirely filled it, and the public was highly gratified with the eloquence diſplayed in theſe compoſitions. In 1739 he publiſhed a humorous pamphlet, entitled "Marmor Norfolcienſe," conſiſting of a ſuppoſed ancient prophecy in Latin monkiſh rhymes, with an explanation. He compoſed, about the ſame period, ſeveral biographical articles for the Gentleman's Magazine, of which the principal was the life of Savage, which was afterwards publiſhed ſeparately, and has been univerſally admired both as a moſt intereſting and curious portrait, and as containing many admirable reflections on life and manners. In the year 1747 he publiſhed the plan of his Engliſh Dictionary, addreſſed to the earl of Cheſterfield, whom he would gladly have recognized as his patron in this arduous taſk. But his lordſhip concerned himſelf very little about the author or his work. No two men could be more oppoſite in their manners than Johnſon and lord Cheſterfield, and a very ſlight intercourſe on this occaſion terminated in their mutual averſion, ſo that the author in his preface informed the public, that "the *Engliſh Dictionary* was written with little aſſiſtance of the learned, and without any patronage of the great; not in the ſoft obſcurities of retirement, or under the ſhelter of academic bowers, but amidſt inconvenience and diſtraction, in ſickneſs and in ſorrow." From the bookſellers, Johnſon received fifteen hundred guineas for his labour, which was not completed till the year 1755. The intervals of this compilation were ſufficient to allow of various literary avocations. In 1747 he wrote a prologue on the opening of Drury-lane theatre. In 1749 he produced another imitation of Juvenal, entitled "The Vanity of Human Wiſhes;" and his tragedy of "Irene." He next commenced his periodical work, entitled "The Rambler," which came out in papers at the rate of two in a week, from the month of March 1750, till the ſame month in 1752. He was the author of the whole of this work, with the exception of about ten papers only, and in it he appears the warm and ſtedfaſt friend of religion and morality. The ſerious ſtyle of the Rambler prevented it at firſt from attaining a very extenſive circulation, but after it was collected into volumes, it roſe in the public eſtimation, and the author ſaw the publication of the tenth edition. Soon after the cloſe of this paper he had the misfortune to loſe his wife, a circumſtance which he never ceaſed to deplore. Not long afterwards he took into his houſe, as an inmate, Mrs. Anne Williams, the daughter of a phyſician in South Wales, who had conſumed his time and fortune in purſuit of the longitude. Her deſtitute condition, aggravated by blindneſs, with her talents for writing and converſation, recommended her to the benevolence of Mr. Johnſon. In the "Adventurer," conducted by Dr. Hawkſworth, he intereſted himſelf, ſupplied it with ſeveral papers of his own, and obtained for it the contributions of Mr. Warton. Previouſly to the publication of his dictionary, the degree of M. A. was conferred on him by the univerſity of Oxford, and about the ſame time the earl of Cheſterfield wrote two letters in its favour in "The World" This civility was regarded, by Johnſon, as an advance from that nobleman for the purpoſe of obtaining from him a dedication as patron of the work, but he now rejected the patronage which he would before have gladly accepted, and wrote a letter to the noble lord, in which he employed all the force of pointed ſarcaſm and manly diſdain to make him aſhamed of his former conduct. The dictionary was received by the public with general applauſe, and its author was immediately ranked among the greateſt benefactors of his native tongue. The publication of this great work did not relieve him from his embarraſſments, for the price of the labour had been conſumed in the progreſs of its compilation. He was ſtill entirely dependent upon the exertions of the day for its ſupport, and ſo low was he reduced, though now regarded as an honour to his country, that in the following year he was put under an arreſt for the trifling ſum of five or ſix pounds. In 1758 he began "The Idler," a periodical paper, which was publiſhed in a weekly newſpaper. On the death of his mother in 1759, he wrote the romance of "Raſſelas," to defray the expences of her funeral, and to pay her debts. This, though written in a very haſty manner, is reckoned one of his moſt ſplendid performances: it is elegant in language, rich in imagery, and weighty in ſentiment. It has been tranſlated into ſeveral modern languages. Such, however, was the depreſſed ſtate of his finances, that he was obliged to break up houſe-keeping and retire to chambers. From this ſituation he was reſcued by the grant of a penſion of 300*l.* *per annum*, in 1762, without any ſtipulation with reſpect to his literary exertions. In 1765 he had the honour of an interview with his majeſty in the royal library, when the ſovereign aſked if he intended to publiſh any more works? To this he replied, that he thought he had written enough, on which the king ſaid, "I ſhould have thought ſo too, if you had not written ſo well." In this year he publiſhed his edition of Shakſpeare's Works, which was ſent into the world with a preface, written with all the powers of his maſterly pen, and which is reckoned among the moſt valuable of his critical diſquiſitions. About this period he inſtituted a literary club, conſiſting of ſeveral of the moſt celebrated men of the age, among whom were ſome who occupied very elevated ſituations in ſociety. In 1770 he appeared an advocate for the meaſures of government, and publiſhed, firſt, "The Falſe Alarm," occaſioned by the expulſion of Mr. Wilkes from the houſe of commons. This was followed by "Thoughts on the late Tranſactions reſpecting Falkland's Iſland," deſigned to ſhew the unreaſonableneſs of going to war on account of the conduct of Spain relative to that barren poſſeſſion. His next publication on political ſubjects was entitled "The Patriot," which was compoſed on the eve of a general election in order to indiſpoſe the people againſt the meaſures of the oppoſition. In 1775 he publiſhed, "Taxation no Tyranny," which was written in defence of the right of the mother country taxing the colonies at pleaſure. Theſe pamphlets, which were probably written on principle, did but little ſervice to the cauſe which he vindicated. In 1773 he went on a tour with Mr. Boſwell to the weſtern iſlands of Scotland, of which journey he publiſhed an account under the title of "A Journey to the Weſtern Iſlands of Scotland." In this he gave a moſt deciſive opinion againſt the authenticity of the poems aſcribed to Oſſian, which occaſioned a difference between him and the tranſlator, Mr. Macpherſon. In 1775, the univerſity of Oxford conferred on him, through the intereſt of the miniſter, the degree of doctor of laws, which he highly valued. The ſome honour had been given him ſome years before by the univerſity of Dublin, of which he had made no uſe. When the unhappy Dr. Dodd lay under ſentence of death, in Newgate, Johnſon, moved either by compaſſion for the man, or by a deſire of reſcuing the cloth from public diſgrace, wrote two petitions to his majeſty in his name, and ſupplied him with a ſpeech at the bar, and a ſermon to be preached to his fellow convicts. (See Dodd.) In the year 1779, Dr. Johnſon began his laſt literary undertaking, "The Lives of the Engliſh Poets," which, notwithſtanding the ſtrong prejudices of the author, may be regarded as a moſt valuable treaſure of ſound criticiſm, and a model of literary biography. This work was completed in 1781: it is not only attached to his edition of the Engliſh poets, but has been re-printed a great many times in a ſeparate form. The concluding portion of Dr. Johnſon's life was clouded over by the loſs of ſeveral highly reſpected friends, by a progreſſive decline of health, and by the proſpect of approaching diſſolution, which neither his religion nor his philoſophy taught him to bear with even decent compoſure. At laſt, however, his mind became calm, compoſed, and truly reſigned: he died December 13th, 1785, in the 75th year of his age. His remains, attended by a reſpectable concourſe of friends, were interred in Weſtminſter abbey; and a monumental ſtatue has been erected to his memory in St. Paul's cathedral. His works, with a life of the author, were publiſhed collectively in 11 volumes, 8vo. by ſir John Hawkins, in 1787; and in 1792, a new edition of them in 12 volumes, with a life by Mr. Murphy, was given to the public. Mr. Boſwell and Mrs. Piozzi have likewiſe given ample accounts of their friend: perhaps there is no inſtance of a private man of letters, in this country, whoſe deceaſe was marked by the appearance of ſo many laudatory and biographical tributes to his public reputation. As a writer, Dr. Johnſon did much ſervice to his country, by fixing its language and regulating its morality. In his perſon he was large, robuſt, and unwieldy; in his dreſs he was ſingular and ſlovenly; in converſation he was poſitive, and impatient of all contradiction. But with theſe deductions, he was an excellent character; he had a heart full of tenderneſs and compaſſion, and all his actions were the reſult of principle. He was a zealous advocate for what he regarded as the truth. He was high in his religious and political principles, and at one period of his life he was friendly to the views of the houſe of Stuart. He had a noble independence of mind, and would never ſtoop to any man however exalted, nor diſguiſe his ſentiments to flatter another. His judgment was uncommonly acute, his imagination quick, his memory tenacious, and his converſation, though very dictatorial, was often brilliant, and always inſtructive. For farther particulars, the reader is referred to the works above mentioned.

Johnson, in *Geography*, a county of America, in North Carolina and Newbern diſtrict, containing 6201 inhabitants, of whom 1763 are ſlaves. It is 30 miles ſquare, and watered by ſeveral ſtreams. The greateſt part of the county is level, and its principal produce is corn. Its chief town is Smithfield.

JOHNSONIA, in *Botany*, ſo named by Mr. R. Brown in memory of Dr. Thomas Johnſon, author of ſome little botanical works, publiſhed in the form of travels between 1629 and 1641, and editor of the ſecond edition of Gerarde's Herbal in 1633. Wood ſays he was killed, while fighting in the royal cauſe, in September 1644. Brown. Prodr. Nov. Holl. v. 1. 287. Claſs and order, *Triandria Monogynia*. Nat. Ord. *Aſphodeli*, Juſſ.

Eſſ. Ch. Perianth (rather corolla) in ſix deep equal ſegments, withering, deciduous. Filaments dilated and united at their baſe, inſerted into the baſe of the inner ſegments of the corolla. Style thread-ſhaped. Stigma obtuſe. Capſule ſuperior, of three cells and three valves, with partitions from the middle of the valves. Seeds two in each cell, inſerted into the central column, one of them pendulous. Scar creſted.

1. J. *lupulina*. Native of the ſouth coaſt of New Holland. *Root* fibrous, perennial. *Leaves* two-ranked, twiſted, linear, dilated, and half ſheathing at the baſe. *Stalk* radical, ſimple, bearing near its top a ſolitary, oblong, hop-like ſpike of ſmall ſeſſile *flowers*, with coloured imbricated *bracteas*, the lowermoſt of which are ſmall and barren.

JOHNSTON, John, in *Biography*, an eminent naturaliſt, was born at Sambter, in Great Poland, in the year 1603: he received the greater part of his education in his own country; but in 1622, he came to England, and from thence he went to Scotland, where he ſtudied with great diligence in the univerſity of St. Andrews till the year 1625. He afterwards ſtudied at Leyden and Cambridge. He undertook the education of the two ſons of the count de Kurtzbach, and accompanied them to Holland. While he reſided with his pupils at Leyden, he took his degree as doctor of phyſic; and when he went a third time to England, the ſame honour was conferred on him by the univerſity of Cambridge. He died in June 1675, in the 72d year of his age. He is known in the literary world by a number of works in the different departments of natural hiſtory. Gen. Biog.

Johnston, in *Geography*, a townſhip of America, in Providence county, Rhode iſland, weſt of the town of Providence; containing 1364 inhabitants.—Alſo, a townſhip in Franklin county, Vermont; having 135 inhabitants.

JOHNSTONE, George, in *Biography*, a naval commander, ſon of a Scotch baronet, devoted himſelf to the ſea ſervice at an early period of life. After paſſing through the ſubordinate

ſubordinate ſtations, he was, in the year 1760, made maſter and commander; and in two years after, he was raiſed to the rank of poſt captain. At the peace, he was appointed governor of Weſt Florida; and on his return to England, he took an active part in the affairs of the Eaſt India company, particularly in oppoſition to lord Clive. In 1771 he wrote a work, entitled, "Thoughts on our Acquiſitions in the Eaſt Indies, particularly reſpecting Bengal." He ſat twice in parliament, firſt for Cockermouth, and afterwards for Appleby. He had a duel with lord George Germaine, on account of ſome reflections which fell from him in the houſe reſpecting his lordſhip. He was one of the commiſſioners ſent to treat with the Americans. He died in 1787.

Johnstone's *Straits*, in *Geography*, a channel of the Pacific ocean, between the iſland of Quadre and Vancouver, and the weſt coaſt of North America. This channel branches off from the northern part of the gulf of Georgia, from point Chatham to the weſt, bearing a little north for about 60 miles in length, the breadth being from two to four. N. lat. 50° 20′ to 50° 35′. E. long. 233° to 234° 46′.

JOHNSTOWN, a poſt-town of America, and capital of Montgomery county, in the ſtate of New York, ſituated on the north bank of Mohawk river, 24 miles weſt of Schenactady. The town contains about 70 houſes, a Preſbyterian and an Epiſcopal church, a court-houſe, and a gaol. In the townſhip are 3932 inhabitants.—Alſo, a town in the townſhip of Edwardſburgh, Upper Canada, ſituated upon the river St. Lawrence, above the uppermoſt rapids, in aſcending to lake Ontario. From this town veſſels may be navigated with ſafety to Queenſtown, and at the ports of lake Ontario.

Johnstown, *New*, a town in the townſhip of Cornwall, Upper Canada, ſituated upon the river St Lawrence, below the long Saalt, to the northward of Grand Iſle St. Regis; and is now called Cornwall.

Johnstown, the name of ſeveral villages in Ireland. One of theſe, in the county of Kilkenny, has been lately made a poſt-town. It contains a number of neat houſes, built for the accommodation of thoſe who frequent the neighbouring chalybeate Spa of Ballyſpellan. It is on the mail-coach road from Dublin to Cork, through Caſhel, and is 60 miles S.W. from Dublin.—Another Johnſtown, in the county of Kildare, is about 13 miles from Dublin, on the Great Southern road; and in conſequence of a good inn, is frequently made a ſtage by thoſe who travel poſt.—Two others, called St. Johnſtown, were formerly boroughs repreſented in parliament: one of them in the county of Donegal, on the river Foyle, which is here of conſiderable breadth, 87 miles N. by W. from Strabane, and 108½ N. by W. from Dublin; the other in the county of Longford, 6 miles W. from Granard.—There is alſo a ſmall town called Johnſtown Bridge, in the county of Kildare, on the borders of Meath, ſituated on the river Blackwater, 21 miles from Dublin.

JOHOR, a town of the peninſula of Malacca, near the ſouth coaſt, and capital of a kingdom of the ſame name. N. lat. 1° 40′. E. long. 103° 54′.

JOIGNY, a town of France, and principal place of a diſtrict, in the department of the Yonne, near the river Yonne. The place contains 5219, and the canton 13,137 inhabitants, on a territory of 307½ kiliometres, in 17 communes; 14 miles N.W. of Auxerre. N. lat. 47° 59′. E. long. 3° 29′.

JOINAGUR. See Jyenagur.

JOINDER, or Joynder, is the coupling, or joining, two perſons in one action, or ſuit, againſt another. See Demurrer.

JOINERY is a branch in *Civil Architecture*, and conſiſts of the art of framing or joining wood together, for internal and external finiſhings of houſes; as the coverings and linings of rough walls, or the coverings of rough timbers, and of the conſtruction of doors, windows, and ſtairs.

Hence joinery requires much more accurate and nice workmanſhip than carpentry, which conſiſts only of rough timbers, uſed in ſupporting the various parts of an edifice: joinery is therefore uſed by way of decoration only, and being always near to the eye, and conſequently liable to inſpection, requires that the joints ſhould be fitted together with the utmoſt care, and the ſurfaces made ſmooth.

The wood uſed is called ſtuff, and is previouſly formed by the pit-ſaw into rectangular priſms, which are denominated boards, battens, or planks, according to their breadth. Battens run from two to ſeven inches wide, boards from ſeven to nine inches wide, and planks from nine inches to any greater breadth that can be cut out of a piece of wood.

The operations of joinery conſiſt of forming ſurfaces of various kinds, alſo of grooving, rebating, and moulding, and of mortiſing and tenoning, and laſtly, of joining two or ſeveral pieces together, ſo as to form a frame or ſolid maſs.

Surfaces, in joinery, are either plane or curved, but moſt frequently plane.

All kinds of ſurfaces are firſt formed in the rough, and finally brought to exact forms by means of tools adapted thereto.

Grooving conſiſts in taking away a part of a rectangular ſection from a piece of wood, ſo as to form a channel of equal breadth throughout, with three ſurfaces, one being parallel, and the other two perpendicular to the ſurface of the wood from which the channel is receſſed: the channel thus formed is called a groove.

Rebating conſiſts in taking away a part from a piece of wood of a rectangular ſection, ſo as to leave only two ſides, each of a parallel breadth, the one ſide being perpendicular to the ſurface of the wood, and the other parallel thereto: the cavity thus formed is called a rebate. From this definition it is manifeſt, that a rebate can only be formed by reducing the piece of wood to be rebated at the angle itſelf, and may therefore be looked upon as a half groove.

A mortiſe is a cavity receſſed within the ſurface of a piece of wood, with four ſides perpendicular to that ſurface, and likewiſe to each other: the act of making a mortiſe is called mortiſing.

A tenon is a projection formed on the end of a piece of wood with four plane ſides, at right angles to each other, and to a plane, from which it projects; and this plane is called the ſhoulder of the tenon.

In the following, all pieces of wood whatever are ſuppoſed to be rectangular priſms, and the length in a direction of the fibres; two of the ſides of every mortiſe to be perpendicular, and the other two ſides parallel to the fibres; the four ſides of every tenon in the direction of the fibres, unleſs otherwiſe aſſerted: likewiſe, if two of the ſurfaces of a piece of wood be of greater breadth than the other two, theſe are called the edges and thoſe the ſides, and each line of concourſe, formed by two adjacent ſides, is called an arris.

Moulding conſiſts in forming the ſurface of a piece by curve or plane ſurfaces, or by both, in ſuch a manner, that all parallel ſections will be ſimilar figures, that is, their boundaries may be made all to coincide.

The firſt thing to be done in joinery is to ſelect the ſtuff or boards, which ought to be well ſeaſoned for every purpoſe in joinery, and then line it out; and if the ſtuff is not already at the ſize, as is moſt frequently the caſe, it muſt be ripped out with the ripping ſaw, or croſs cut with the hand ſaw, or both, as may be wanted. The next thing is the planing of the ſtuff firſt upon a ſide, then the edge ſquared, and then gaged to a breadth and thickneſs, ſhould either or both be found neceſſary.

Two or more pieces of ſtuff may be faſtened together in various ways by pins of wood or by nails, but in work prepared by the joiner for the uſe of building, pieces are more frequently joined together by making their ſurfaces coincide, and then plaſtering them over with a hot tenacious liquid called glue, then rubbing the ſurfaces until the glue has been almoſt rubbed out, and the one piece brought to its ſituation with reſpect to the other. The beſt work is always joined by this method.

When boards are required of a greater breadth than common, ſeveral common boards muſt be faſtened together edge to edge, either by nailing them to pieces extending acroſs the breadth, or gluing them edge to edge, or by joining pieces tranſverſely together with ſmall boards, tongued and grooved into the interſtices.

Two pieces of ſtuff are joined together at right or oblique angles by mortiſe and tenon adapted to each other, and faſtened together with glue. When a frame, conſiſting of ſeveral pieces, is required, the mortiſes and tenons are fitted together, and the joints glued all at one time, then entered to their places, and forced together by means of an inſtrument called a cramp.

The operation of forming a given ſurface, by taking away the ſuperfluous wood, is called planing, and the tools themſelves planes.

The firſt tools uſed by joiners are bench planes, which generally conſiſt of a jack plane, for taking away the rough of the ſaw and the ſuperfluous wood, only leaving ſo much as is ſufficient to ſmooth the ſurface; the trying plane to ſmooth or reduce the ridges left by the jack plane, and to ſtraighten or regulate the ſurface, whether it be plane or convex; the long plane when the ſurface is required to be very ſtraight; and the ſmoothing plane in ſmoothing, as its name implies, and giving the laſt finiſh to the work.

Beſides the bench planes there are others for forming any kind of priſmatic ſurfaces whatever, as rebating planes, grooving planes, and moulding planes: but for a more particular deſcription of theſe and the bench planes, we ſhall refer to the article PLANE.

The tools employed in boring cylindric holes are a ſtock with bits of various deſcriptions and ſizes, gimblets and brad awls of ſeveral diameters.

The tools uſed in paring the wood obliquely, or acroſs the fibres, and for cutting rectangular priſmatic cavities, are in general denominated chiſſels: thoſe for paring the wood acroſs the fibres are called firmers, or paring chiſſels, and thoſe for cutting rectangular priſmatic cavities, are called mortiſe chiſſels, the rectangular cavities themſelves being called mortiſes when made to receive a projection of the ſame form and ſize, and by this means to faſten two pieces of wood together at any angle. The ſides of all chiſſels, in a direction of their length, are ſtraight, and the ſide of a chiſſel which contains the cutting edge at the end is ſteel. The beſt paring chiſſels are made entirely of caſt ſteel. Chiſſels for paring concave ſurfaces are denominated gouges.

Dividing wood, by cutting away a very thin portion of the material of equal thickneſs throughout, to any required extent, by means of a thin plate of ſteel with a toothed edge, is called ſawing, and the inſtruments themſelves are called ſaws, which are of ſeveral kinds, as the ripping ſaw, for dividing boards into ſeparate pieces in a direction of the fibres; the hand ſaw, for croſs cutting and ſawing thin pieces in a direction of the grain; the pannel ſaw, either for croſs cutting or cutting very thin boards longitudinally; the tenon ſaw, with a thick iron back, for making an inciſion of any depth below the ſurface of the wood, and for cutting pieces entirely through, not exceeding the breadth of that part of the plate without the iron back; likewiſe a ſaſh ſaw and a dovetail ſaw, uſed much in the ſame way as the tenon ſaw. From the thinneſs of the plates of theſe three laſt ſaws, it is neceſſary to ſtiffen them by a ſtrong piece of metal called the back, which is grooved to receive the upper edge of the plate that is fixed to the back, and which is thereby ſecured and prevented from buckling. When it is required to divide boards into curved pieces, a very narrow ſaw without a back, called a compaſs ſaw, is uſed, and in cutting a very ſmall hole a ſaw of a ſimilar deſcription, called a key-hole ſaw, is employed. All theſe ſaws have their plates longer and thinner, and their teeth finer, as they ſucceed each other in the order here mentioned, excepting the two laſt, which have thicker plates and coarſer teeth than either the ſaſh or dovetail ſaw. The external and internal angles of the teeth of all ſaws are generally formed at an angle of 60 degrees, and the front edge teeth ſlope backward in a ſmall degree, but incline or recline from the ſtraight line drawn from the interior angle perpendicular to the edge in the plane of the plate, as the ſaw may be employed in ripping or in croſs cutting, or cutting perpendicular to the fibres. The teeth of all ſaws, except turning and key-hole ſaws, are bent on contrary ſides of the plate, each two teeth ſucceeding each other, being alike bent on the different ſides of the plate; *viz.* the one as much to the one ſide as the other is to the other ſide, and conſequently all the teeth on the ſame ſide alike bent throughout the length of the plate for the purpoſe of clearing the ſides of the cut which it makes in the wood.

Of all cutting tools whatever, the ſaw is the moſt uſeful to the joiner, as the timber or wood which he employs can be divided into ſlips or bars of any ſize, with no more waſte of ſtuff than a ſlice, the breadth of which is equal to the depth of the piece to be cut through, and the thickneſs equal to the diſtance of the teeth between their extreme points on the alternate ſides of the ſaw meaſured on a line perpendicular to the ſaid ſides: whereas, without the uſe of the ſaw, cylindrical trees could only be reduced to the intended ſize by means of the axe; in the uſe of which there would not only be an immenſe conſumption of ſtuff, but alſo much greater labour would be required to ſtraighten it.

Joiners uſe a ſmall axe, called a hatchet, for cutting off the ſuperfluous wood from the edge of a piece of a board, when the waſte is not of ſufficient conſequence to be ſawn.

All the above are what are commonly denominated edge tools, but there are others required to regulate the forms. All angles whatever are formed by other reverſed angles of the ſame number of degrees as an exterior angle by an interior one, and the contrary. The inſtrument for trying right angles is called a ſquare, and thoſe for trying oblique angles are called bevels. The two ſides which form the edge of a ſquare are always ſtationary, but thoſe of bevels are generally moveable one leg upon the other round a joint, In ſome caſes, where a great number of pieces are required to be wrought to the ſame angle, a ſtationary bevel, called a joint hook, is uſed.

When it is required to reduce a piece of ſtuff to a parallel breadth, an inſtrument called a gage is uſed for the purpoſe. The gage conſiſts generally of a ſquare piece with a ſquare mortiſe, through which a bar at right angles thereto is fitted and made to ſlide. The bar, which is called the ſtem, has a ſharp point, cutter, or tooth at one extremity, projecting a little from the ſurface, ſo that when the ſide of the gage, next to the end which has the point, is applied upon the vertical ſurface of the wood, with the flat ſide of the ſtem which has the tooth upon the horizontal ſurface, and puſhed and drawn alternately by the workman from and towards him, the cutter will make an inciſion from the ſurface into the wood, at a parallel diſtance from the upper edge of the vertical ſide on the right hand. This line, ſo drawn, will mark out with preciſion, and ſhew the ſuperfluous ſtuff to be taken away.

When a mortiſe is required to be cut in a piece of wood, a gage with two teeth is uſed. The conſtruction of this inſtrument is the ſame as the common gage; but in addition thereto, the ſtem has a longitudinal ſlider with a tooth projecting from the end of the ſlider, ſo that the two teeth may be brought nearer, or to any remote diſtance from each other, at pleaſure; and alſo to any diſtance, from the face of the head or guide within the reach of the ſtem.

When wood has been planed, and required to be ſawn acroſs the fibres, and as it is neceſſary to be kept ſtationary while ſawing, in order to prevent the ſides or the edges from being bruiſed, joiners uſe a flat piece of wood with two projecting knobs on the oppoſite ſides, one at each end, called a ſide hook. The vertical ſide of the interior angle of one of the knobs is placed cloſe to the vertical ſide, and the under ſide upon the top of the bench; then the wood is preſſed againſt the knob which projects from the upper ſurface while it is cutting with the ſaw; but the uſe of two ſide hooks is better, as they keep the piece of wood to be ſawn more ſteady.

When it is required to cut a piece of wood to a mitre with one ſide; that is, to half a right angle, joiners uſe a trunk of wood with three ſides, like a box without ends, or a top, the ſides and bottom being parallel pieces, and the ſides of equal heights: through each of the oppoſite ſides is cut a kerf in a plane, perpendicular to the bottom, at oblique angles of 45 and 135 degrees, with the planes of the ſides; and another kerf is made in the ſame manner, ſo as to have its plane at right angles to the former. The trunk thus conſtructed is called a mitre-box. When the wood is to be cut, the mitre-box is fixed ſteady againſt two ſide hooks, and the piece, which is always leſs than the interior breadth of the mitre-box, is laid within, and preſſed againſt the farther interior angle of the mitre-box with the ſide downwards, to which the ſaw-kerf is intended to be perpendicular, and in this poſition it is to be cut. The two kerfs in the ſides of the mitre-box are requiſite, in order to form the acute angle on the right or left-hand ſide of the piece, as may be required.

When it is required to make a piece of wood ſtraight in one direction, joiners uſe a ſlip of wood ſtraightened on one edge, from which the ſlip of wood itſelf is called a ſtraight edge. Its uſe is obvious; by its application it will be ſeen whether there is a coincidence between the ſtraight edge and the ſurface.

When it is required to know whether the ſurface of a piece of wood is in the ſame plane, joiners uſe two ſlips of wood ſtraightened each on one edge with the oppoſite edge parallel, and both pieces of the ſame breadth between the parallel edges: each piece has therefore two ſtraight edges. Suppoſe it were required to know whether a board is twiſted or its ſurface in a plane, the workman lays one of the ſlips acroſs the one end, and the other acroſs the other end of the board, with one of the ſtraight edges of each upon the ſurface; then he looks in the longitudinal direction of the board, over the upper edges of the two ſlips, until his eye and the two upper edges of the ſlips are in one plane; or otherwiſe, the interſection of the plane, paſſing through the eye and the upper edge of the neareſt ſlip, interſect the upper edge of the farther ſlip. If it happen as in the former caſe, the ends of the wood under the ſlips are in the ſame plane; but ſhould it happen as in the latter, they are not. In this laſt caſe the ſurface is ſaid to wind; and when the ſurface is ſo reduced that every two lines are in one plane, it is ſaid to be out of winding, which implies its being an entire plane: from the uſe of theſe ſlips they are denominated winding ſticks.

Before we can proceed to the method of bringing a rough ſurface to a plane, it will firſt be neceſſary to ſhew how to make a ſtraight edge or ruller.

Here the joiner muſt not loſe ſight of the definition of a ſtraight line, *viz.* a ſtraight line is that which will always coincide with another ſtraight line, however applied together.

The operation of making the edge of a board ſtraight is called by joiners ſhooting, and the edge ſo made is ſaid to be ſhot.

Straight edges may be thus formed; plane the edges of two boards and apply them together, ſo that the ſuperficies or faces of the boards be in the ſame plane, and if there be no cavity between the joint the edges will be ſtraight; but if not, the faces muſt be applied to each other, the edges brought together, and planed and tried as before, until they are found to coincide.

Another mode is by having a plane ſurface given: plane the edges of a board as ſtraight as the eye will admit of, and apply the face of it to that of the plane, and by the edge of the board draw a line, turn the board over with the other ſide upon the plane, and bring the planed edge to the line drawn before, and the extremities of the edges to their former places, and draw another line; then if all the parts of this line coincide with the former line, the edge is already ſtraight, but if not, repeat the operation as often as may be found neceſſary.

Another mode is to plane the edge of a board as ſtraight as the eye will admit of; then plane the edge of another board until it is made to coincide with the former; take a third board and plane the edge of this in like manner, by making it coincide with the edge of the firſt board; apply the edges of the two laſt boards together, then if they coincide the operation is at an end, but if not, repeat it as often as may be found neceſſary.

By any of the methods now ſhewn, the ſuperficies of the boards, to be ſhot, are ſuppoſed to be parallel planes not very diſtant from each other; for if the faces be not parallel, or if the thickneſs be conſiderable, the operation will be the more liable to error.

To reduce the rough ſurface of a body to a plane.—This will not be very difficult, when it is known that a plane is that which will every where coincide with a ſtraight line.

The moſt practical methods are the following: Let the workman provide two winding ſticks, and apply them as before directed, making the ends out of winding if they are not found to be ſo; then if all the parts of the ſurface are ſtraight on which the edges of the winding ſticks were placed, it is evident that the whole ſurface muſt be plane. If the ſurface is hollow between the ſaid lines, one of the ends or both muſt be planed lower, until the ſurface acquires a ſmall convexity in the length, and then, if ſtraightened between the ſtraight lines at the ends, it will be a perfect plane.

Another mode of forming a plane of the ſurface is of a quadrilateral form: apply a ruler along the diagonals, then if they are ſtraight they are in a plane, but if they are both hollow, or both round, the ſurface to be reduced is either concave or convex, and muſt be ſtraightened in theſe directions accordingly; and, laſtly, if by trying acroſs the diagonals with the ſtraight edge it be found that the one be hollow and the other round, the ſurface of the board winds. In this caſe bring down the protuberant part of the convex diagonal, ſo as to be ſtraight with the two extremities; then ſtraighten the concave diagonal, by planing either of the two ends or both of them, according as the thickneſs of the board will require. Both diagonals being now ſtraight, traverſe the wood, that is, plane it acroſs the fibres, until all the protuberant parts between the diagonals are removed; then the workman may proceed to ſmooth it by working it in the direction of the fibres.

To join any number of planks together, ſo as to form a board of a determinate breadth, the fibres of each running longitudinal to thoſe of any other.—Shoot the two edges that are to be joined; turn the ſides of the boards towards each other, ſo that the edges that are ſhot may be both uppermoſt; ſpread theſe edges over with ſtrong glue of a proper conſiſtence, made very hot; one of the boards being fixed, turn the other upon it, ſo that the two edges may coincide, and that the faces may be both in the ſame plane; rub the upper one to and fro in the direction of the fibres till the glue is almoſt out of the joint; let theſe dry for a few hours; then proceed to make another joint; continue to join as many boards or planks in the ſame manner, till the whole intended breadth be made out. If the boards or planks of which the board is to be compoſed are very long, the edges that are to be united would require to be warmed before a fire; and, for rubbing and keeping the joints fair to each other, three men would be found neceſſary, one at each extremity, and one at the middle. Boards, glued together with this kind of cement, will ſtand as long as the ſubſtance of the deals or planks compoſing them, if not expoſed to rain or intenſe heat, provided that the wood has been well ſeaſoned beforehand, and that the grain be free and ſtraight, uninterrupted with few or no knots. When a board which is to be expoſed to the weather is to be made of ſeveral boards or planks, the cement to be uſed for uniting them ſhould not be of ſkin glue, but of white lead ground up with linſeed-oil, ſo thin that the colour may be ſenſibly changed into a whitiſh caſt: this kind of glue will require a much greater time to dry than ſkin glue. Boards to be expoſed to the weather, when their thickneſs will admit, are frequently tongued together; that is, the edges of both boards are grooved to an equal diſtance from the faces, and to an equal depth; and a ſlip of wood is made to fit the cavity made in both: this ſlip ſhould be made to fill the grooves, but ought not to be ſo tight as to prevent the joint from being rubbed with proper cement.

To glue any two boards together forming a given angle.—This may either be accompliſhed by ſhooting the edge of the one board to the whole of the given angle, and the face of the other ſtraight; then, by applying theſe two ſurfaces together, and rubbing as before, they will form the angle required; or, if the two edges are ſhot to half the given angle, and the edges applied together and rubbed and ſet as before, the faces of the boards will form the angle required. In both theſe methods, when only one ſide of the board is to be expoſed to ſight, which is moſt commonly the caſe, pieces of wood called blocks are fitted to the angle, and the ſides glued acroſs the joint or legs of the angle, being previouſly planed for that purpoſe.

To form wooden architraves for apertures by gluing longitudinal pieces together.—Architraves may be formed out of the ſolid pieces; but as their formation in this way is attended with a waſte of both ſtuff and time, the moſt eligible method is to glue the parts longitudinally together, as is beſt adapted to the nature of the mouldings. Architraves of the Grecian form, for doors and windows, generally conſiſt of one or two faces in parallel planes, the one of which recedes only in a ſmall degree from the other, while the outer edge is terminated with one or ſeveral mouldings which have a very prominent projection. In this caſe make a board of ſufficient thickneſs, and in breadth equal to the breadth of the architrave: prepare a ſlip of wood of a ſufficient thickneſs and breadth for the mouldings on the outer termination of the architrave; glue this ſlip upon the face cloſe to the edge of the board, with the outer edge fluſh therewith. In the operation two men will be at leaſt required to rub the ſlip to a joint with the board; and as it often happens that the ſide of the ſlip, which is to comply with the ſurface of the board, is conſiderably bent, the ſlip is nailed down to the board; but, previouſly, ſmall ſquare pieces of wood, called buttons, are bored with holes, one in each, and a nail is put through the hole to the head; then the ſlip is alſo bored with a brad-awl; and the nails, with the pieces thus deſcribed, are entered and driven home as far as the buttons will permit. The buttons may be about three quarters of an inch thick, and the other two dimenſions each equal to, or ſomething more than, the breadth of the ſlip. The ſlip is ſometimes grooved; and the edge of the board is tongued, glued, and inſerted in the groove, inſtead of the above method. Sometimes, alſo, the two faces are made of different boards tongued together at their joining; then the whole is afterwards ſtuck into mouldings.

To form the ſurface of a cylinder with wood, whoſe fibres are in planes perpendicular to the axis of the cylinder, ſuch as may be uſed in circular dado, or the ſoffits of windows.

Method 1.—When the dimenſion of the cylindric ſurface, parallel to the axis, is not broader than a plank or board: this may be done by bending and gluing ſeveral veneers together; and the firſt upon a mould or brackets, the edges of which are in the ſurface of the propoſed cylinder parallel to its axis.

This may be accompliſhed by means of two ſets of brackets fixed upon a board with hollow cylindric ſpace between them, of ſufficient thickneſs for taking in the veneers, and double wedges for confining them. If this operation is carefully done, and the glue properly dried, the wedges may be ſlackened, and the cylindric part ſo glued up will be found to ſtand very well; but it muſt be obſerved, that, as the wood has a natural tendency to unbend itſelf, the curve ſurface, upon which it is glued, ſhould be ſomewhat quicker than that intended to be made.

Some workmen take another method by forming a hollow cradle, and bending the veneers into it, and confining their ends with wedges, which compreſs them together; and by a very ſmall degree of rubbing, with a hammer made for this purpoſe, the glue will be forced out of the joint.

Another method is to form a cradle or templet to the intended ſurface, and lay a veneer upon it; then glue blocks of wood upon the back of it, cloſely fitted to its ſurface, and the other joints to each other, the fibres of the blocks correſponding with thoſe of the veneer.

A third method is to make a cradle and place the veneers upon it, confining one end of them ſpread in the glue between the veneers with a bruſh, and fix a bridle acroſs, confining the ends of this bridle either by nails or by ſcrews; open the veeners again, and put in glue a ſecond time between each two, and fix another bridle acroſs them: proceed in this manner to the other extremity.

A fourth method is to run a number of equi-diſtant grooves acroſs the back of the board at right angles to its edges, leaving only a ſmall thickneſs towards the face, let this be bent round a craddle or templet made on purpoſe; and let the grooves be filled with ſlips of wood, which, after the glue is quite dry, are to be planed down to the ſurface of the cylindric board, which may be ſtiffened with canvas glued acroſs the back.

Inſtead of uſing a grooving plane, workmen frequently make kerfs with the ſaw; but this is not ſo ſtrong when finiſhed, as it is very difficult to inſert the ſlips, and very uncertain as to the depth of each of the kerfs, which will occaſion a very unequal bending of the board, if not to a regular depth.

To bend a board, ſo as to form the fruſtum of a cone, or any ſegmental portion of the fruſtum of a cone, ſuch as the ſoffit of the head of an aperture.—Find the form of the covering according to the geometrical principles of carpentry; cut out a board to this form, and run a number of equidiſtant grooves acroſs it tending to the centre: this being fixed to a templet made to the ſurface of a cone, proceed and finiſh it in the ſame manner as in the laſt method ſhewn for a cylinder.

To bend boards ſo as to form a ſpheric ſurface.—Make a mould to the covering of a given portion of the ſphere in plano, according to the geometrical principles of carpentry; complete the number of ſtaves by this mould; make a templet or mould to a great circle of the ſphere; groove each of the ſtaves acroſs at right angles to a line paſſing through the middle, and bend it round the templet; put ſlips in the grooves; laſtly, ſhoot the edges of the ſtaves, ſo as to be in planes tending to the centre of the ſphere: theſe ſtaves being glued together will form a ſpheric ſurface.

To glue up the ſhaft of a column.—Deſcribe two circles of diameters, equal to thoſe of the ſuperior and inferior ends of the ſhaft.

Circumſcribe theſe by polygons, conſiſting of the ſame number of regular ſides as the column is to conſiſt of ſtaves.

From the angles draw lines to the centre, which will give the bevels for working the edges of the ſtaves. In this proceſs, after two pieces are glued together, and dried, proceed to glue a third piece in the ſame manner and ſo on to the laſt but one. The laſt, previous to being glued, the blocks ſhould be fixed upon it, and then the whole may be cloſed in. N. B. The number of ſtaves ſhould be eight or twelve, otherwiſe the joint will fall in the middle of the flutes, which ſhould not be in the caſe. It is a very good method to diminiſh the ſtaves, previous to their being glued together, as otherwiſe the waſte of ſtuff would be very great.

To glue up the baſe of a column in ſeveral horizontal courſes, or rings, in order to be turned in a lathe.—Conſider the number of horizontal or bevel joints, which are beſt made at the internal angles of mouldings; prepare a board, ſo as to have a plain ſurface; let a circle be deſcribed on the plane of a diameter, equal to the diameter of the greateſt circle in the height of the courſe, and circumſcribe an equilateral polygon about the circle, with as many ſides as there are to be pieces in a courſe, and from the angles draw lines towards the centre: then any radial line, and one of the adjoining ſides of the polygon, will form the angle by which the ends of every two pieces that are to form the courſe will meet, ſo as to make their planes coincide. The geometrical part being thus finiſhed, prepare the pieces each in length equal to the ſide of the polygon, with an acute angle at each end from the outer ſide, equal to the aforeſaid angle on the board, ſo that each piece will thus have a longer and a ſhorter ſide: apply the longer ſide of each piece to the polygon, the ſhorter ſide being next to the centre, ſo that one of the ends may coincide with a radial; then the other end will alſo coincide, and thus the whole will meet together, if the work be true. But as this is difficult, it is common to allow the pieces to be a ſmall matter longer, in order to plane them, ſo as to make cloſe work: for though the methods be true, the workman, though ever ſo careful, cannot work to geometrical exactneſs; even the thickneſs of ſhaving, or the ſmalleſt degree of twiſt in the board, will ſpoil the work. Suppoſe the courſe completely jointed, take the whole to pieces, and glue the ſurfaces which are to meet each other, and rub each two adjacent pieces to a joint, until the whole ring or courſe is firmly cloſed. When the glue is dry, plane the upper ſide truly; take the radius of the greateſt projecting member in the next courſe, and deſcribe a circle upon the top of the courſe, on the ſame axis with the centre of the lower circle; and with the centre of this circle, in the plane of the top of the courſe, biſect any one of the arcs comprehended between two adjacent joints; and from the point of biſection, divide the circumference into as many equal parts as there are pieces in the under courſe, and draw radiating lines towards the centre: join every two neareſt points in the circumference, and thus an inſcribed polygon will be formed; draw lines to touch the circumference parallel to the ſides of the inſcribed polygon, and thus a polygon will be made to circumſcribe the circle: produce the radiating lines, until they meet the angles of the circumſcribing polygon; then the ſides of the circumſcribing polygon will be the ſituations of the bottom edge of the vertical outer ſides of the ſecond courſe, and the radiations the ſituations of the joints. Proceed, as in the firſt courſe, to adapt the pieces to their reſpective ſituations, making cloſe work: glue each piece to its place on the lower courſe, and likewiſe the joints; and when the glue of this courſe is dry, its upper ſide may be planed true. Proceed with the uppermoſt courſe in the like manner, making the joints fall in the middle of the lengths of the pieces of the lower courſe; and when finiſhed, the work may be ſent to the turner.

To glue up the Ionic and Corinthian capitals for carving.—The abacus muſt be glued in parts, ſuch that their joints may be in vertical planes. The leaves and caulicoles of the Corinthian capital may be firſt made of rectangular blocks, and fixed to the vans.

To make a cornice round a cylindric body out of the leaſt quantity of wood, when the body is greater than a half cylinder, and concave, and when the members will nearly touch a right line applied tranſverſely.—Draw a ſection of the cylinder through its axis, and let the ſection of the cornice be repreſented upon the cylindric ſection. Draw a tranſverſe line touching the two extreme members of the cornice: parallel to this line draw another line within, at ſuch a diſtance from the former as may be found neceſſary for thickneſs of ſtuff; produce this laſt line, until it meet the line repreſenting the axis of the cylinder. The junction will either be above or below, according as the cornice is applied to the convex or concave ſides of the cylinder. This meeting is the centre of two concentric circles, whoſe radii are the diſtances between the neareſt and fartheſt extremes of the ſection of the cornice. This is evidently an application of the method of finding the covering of a cone. When mouldings are got out in this manner, *viz.* by a piece which does not occupy the ſpace, when ſet to the place repreſented by the height and breadth, they are ſaid to be ſprung.

When a cornice is to have much projection, the corona or middle part is got out of a ſolid piece, and the parts above and below, or one of them, as may be found neceſſary, only ſet to the ſpring, and ſupported by brackets.

To deſcribe the various kinds of joinings in the practice of joinery.—*Fig.* 1. *Plate* XXII. is a ſection ſhewing the moſt ſimple method of joining boards, or any kind of framed work together at the angles; this kind of joining is much uſed in coarſe work; it is called lap-joining.

Fig. 2. the method of joining troughs together.

Fig. 3. the method of joining dado together at an internal angle.

Fig. 4. the manner of fixing two pieces of framing together at the angle of their meeting with a returned bead, in order that the joint ſhould be concealed. This is only uſed in common finiſhings; in good finiſhings a bead of $\frac{3}{8}$ths of an inch broad is generally run cloſe to the joint, and the angle is left entire.

Fig. 5. ſhews the common method of mitring. This form is always uſed in mouldings at an external angle, and ſometimes alſo in internal angles: but for internal angles, ſcribing is to be preferred, when it can be applied, which may always be the caſe, when there are no quirked mouldings; that is, when mouldings are ſuch that a perpendicular line to the plane of the wall may fall upon any part of them without going through the ſolid of the moulding.

Fig. 6. is another method of mitring. This may be uſed in all plane ſurfaces, at an external angle, but is not applicable to mouldings. This manner of mitring is much more preferable in point of ſtrength to that of *fig.* 5, in caſes where the two can be applied.

Dove-tailing is another mode of joining two plane ſurfaces together at an angle, by cutting pins of a priſmatic form and trapezoidal ſection on the end of one piece, and notching the end of the other in the ſame manner, ſo that the exterior parts of the one is adapted to the indentations of the other, without leaving any cavity when the two ſides are brought home to their places. This is the ſtrongeſt method of joining plane boards; it ſhould always be uſed in work which may be required to be moved from place to place. There are three ſorts of dove-tailing. One kind, called common dove-tailing, ſhews the ends of the joints: another kind, called lap-dove-tailing, conceals the joints of the dove-tails, but ſhews a ſtraight joint, not at the angle, but at a ſmall diſtance parallel to it. The third ſort is called mitre dove-tailing, which ſhews no joint but in the angle. This method is very neat, it is ſtronger than the ſtraight joint ſhewn by the ſection *fig.* 6, and where both ſtrength and beauty is required it muſt be preferred to any other. *Fig.* 7, N° 1, is a ſection of common dove-tailing; N° 2, the ſide of one of the pieces ſhewing the pins; N° 3, ſhews the ends of the pins; N° 4. the ſide of the other piece, ſhewing the indentations for receiving the pins.

Fig. 8. N° 1, 2, 3, 4, and 5, different parts of mitre dove-tailing.

To join two pieces of wood together, the fibres of the one running tranſverſely to the fibres of the other by mortiſe and tenon or dove-tailing.—One method is by cutting a mortiſe to a very ſmall depth in the one piece, and a tenon of the ſame length in the other, and by bolting them together with one or two bolts: where the breadth of the piece having the tenon is conſiderable, the nuts are to be let in from that ſide of the tenoned piece which is not expoſed to ſight; the heads of the bolts upon the mortiſed piece may be ſunk into the wood entirely below the ſurface, and the cavity may be filled up with a piece of the ſame kind of wood, neatly fitted in.

Definitions.—1. A frame, in joinery, is the connection of ſeveral pieces of timber of an equal thickneſs, joined tranſverſely to each other, made faſt by means of mortiſes and tenons, leaving rectangular ſpaces between for other pieces of timber, called pannels, each of which is inſerted into each edge of the former by means of a groove.

2. Thoſe parts of the frame which terminate the two vertical extremes are called ſtyles.

3. The horizontal parts, which are mortiſed into the ſtyles, are called rails.

4. If there be any intermediate pieces mortiſed into the rails, parallel to the ſtyles, ſuch pieces are called muntons.

In framed-work, rails have ſeveral epithets, according to their ſituations; that bordering the framing at the lower extremity is called the bottom rail, that bordering the framing, at the other extremity, is called the top rail. The names of intermediate rails vary according to their number and ſituation. In doors, that in which the lock is inſerted is called the middle, or lock rail; the intermediate rail next to the top rail, is called the frieze rail.

Doors.—A door, in joinery, is a framed piece of timber-work, or boards nailed together, for the purpoſe of ſhutting up at pleaſure any aperture in a wall or partition, in order to give or prevent paſſage from one apartment to another.

Plate XXIII. *fig.* 1, is a four equal-pannelled door: the form is only uſed in very common work, and is frequently without mouldings.

Fig. 2. is a nine-pannelled door, with ſquare pannels at the top. This form is frequently uſed in ſtreet-doors, of which the back is often lined with boards, in the manner of *fig.* 3, fluſh with the ſtyles and top rail; the other rails and muntons muſt therefore be receſſed upon one ſide to receive the boarding.

Fig. 4. is a ſix equal-pannelled pair of folding-doors, having two pannels in the breadth.

Fig. 5. is a double margin, or a pair of folding-doors, with four pannels in height, and two in breadth, having lying pannels below the top-rail, and above the lock-rail.

Fig. 6. is a ten-pannelled pair of folding-doors, five in height, and two in breadth, having lying pannels at the top, bottom, and in the middle, with long pannels between them. Of this form is the ancient door of the Pantheon at Rome.

Fig. 7. a ſaſh-door: this form, if not ſhut with another ſeparate door, ſhould have ſhifting-ſhutters, to cover the glaſs parts, fixed with bolts and nuts. For this purpoſe, it ſhould at leaſt be one inch and a quarter thicker than a pannelled door in the ſame place: this gives room for the outſide of the ſhutter to be fluſh with the ſtyles of the door; but if otherwiſe, an ugly frame muſt be patched round the glazed parts, in order to contain the ſhutter.

Fig. 8. an ancient door, of which form are the windows and door of the temple of Veſta at Rome, and alſo thoſe of the temple of Eretheus at Athens.

Figs. 9 and 10. are doors of communication, or ſuch as, when open, will not encumber the floor, as other kinds of receſſed doors, by jetting into the room, but may either be concealed entirely within the partition, or folded cloſe to it: they are uſed for the purpoſe of making a free communication between one room and another, at great meetings or balls, when any one of the rooms would be inſufficient though large enough for common uſe.

Fig. 9. the elevation of a door to be folded cloſe to the partition, by means of a hanging ſtyle, or pilaſter, on each ſide which is firſt hung to the jamb, then a folding door to each pilaſter.

Fig. 10. is a door conſiſting of four parts: each middle part is hinged to each extreme part; each two parts, on each ſide, in time of company, may be removed entirely out of the way into hollows on each ſide of the partition, and guided by grooves at the top and bottom, and made to ſlide freely upon rollers.

Fig. 11. is a jib-door, that is, ſuch a door as, when ſhut, may be as much concealed as poſſible from having the appearance of a door. Jib-doors are uſed, when only one aperture at the end of the ſide of a room is neceſſary; and when it is required to keep the ſymmetry of that ſide, without having the appearance of a door; the baſe, ſurbaſe, and paper are, therefore, continued over it as in the other parts of the room, the joint being only ſeen at the top, and upon the edge oppoſite the hinge.

JOINING *of* ISSUE. See ISSUE.

JOINT, the juncture, articulation, or aſſemblage, of two or more things. See ARTICULATION.

JOINT, in *Anatomy*, the connection of two or more bones to each other: theſe parts are generally ſo organized as to admit of motion, but in ſome inſtances this is not the caſe.

The joints or articulations are generally referred to three claſſes: the immoveable, or *ſynarthroſis;* the half moveable, or *amphiarthroſis;* and the completely moveable, or *diarthroſis.*

The firſt of theſe includes the various kinds of ſuture; for the deſcription of which, ſee CRANIUM.

The amphiarthroſis, or joint admitting of ſlight motion, is made up either of cartilaginous ligaments (*ſymphyſis*), or of true cartilage (*ſynchondroſis*). The union of the bodies of the vertebræ to each other, and the articulations of the pelvis, are examples of the former: the connection of the firſt pair of ribs to the ſternum, and of the different bones of the ſternum to each other, exemplify the latter.

For the account of the third ſpecies, or moveable articulation, ſee DIARTHROSIS.

A general deſcription of the compoſition of a joint will be found under the article EXTREMITIES, near the beginning; and in the ſame article the particular joints of the limbs are deſcribed. The account of the articulation of the lower jaw is given under DEGLUTITION; that of the connection of the head to the vertebral column under HEAD. The articulations of the vertebræ are conſidered in the article SPINE; thoſe of the ribs, in RIBS; and of the pelvis, in PELVIS.

JOINTS, *Diſeaſes of.* Under this head we intend to notice a few caſes which belong to the department of *Surgery*, and are not elſewhere treated of in this publication.

Inflammation of Joints.—Idiopathic caſes of this kind are not common. The complaint ordinarily originates in conſequence of a contuſion, ſprain, wound, or other kind of injury done to the part affected. Phlegmonous inflammation, whereſoever ſituated, is uniformly attended with certain local ſymptoms, by which both its preſence and degree may be aſcertained. Preternatural redneſs, increaſed heat, a throbbing pain, and a tenſe ſwelling, affecting the ſeat of its attack, are the common marks which denote its exiſtence in all ſituations. When a joint is inflamed, the ſame local phenomena are preſent, and the conſtitution is diſturbed by the uſual ſymptoms of inflammatory fever; but in theſe caſes they are apt to be exceedingly ſevere. The inflammation attacks the capſular ligaments, and not remaining confined to any particular portion of them, it very quickly diffuſes itſelf univerſally over their whole extent, as is commonly the caſe in all inflammations of ſmooth membranes. That there is this peculiarity in inflammation of membranes, is often ſtrikingly proved in the inſtance of peritonitis, ariſing after the operation of lithotomy. Here, we know, that the inflammation commences in the bladder, is communicated to the portion of the peritoneum which covers the fundus and poſterior ſurface of this viſcus, and thence rapidly ſpreads over the whole extent of the abdomen.

The capſules of the joints are naturally endued with little ſenſibility; but, like the gums, and ſeveral other parts in a ſimilar ſtate, they become acutely painful when inflamed. The complaint is accompanied by an increaſed ſecretion of the ſynovia, which becomes of a more aqueous, and of a leſs albuminous quality than it is in a healthy ſtate. Hence this fluid is not ſo well calculated for lubricating the articular ſurfaces and preventing the effects of friction, as it is in the natural condition of the joint. This circumſtance may explain why a grating ſenſation is often perceived on moving the patella when the knee is inflamed.

The capſules of the joints may, as well as other membranes, be thickened by inflammation. At other times an exudation of coagulating lymph may take place upon their internal ſurfaces; and as, by a general law of the animal economy, the contiguous veſſels are always prone to ſhoot into lymph thus effuſed upon an inflamed ſurface, the conſequence frequently is, that organized ſubſtances, ſuch as pieces of cartilage and bone, are produced in the interior of the joint. The inconveniences of theſe extraneous bodies, and the mode of relief, will be a ſubject which we ſhall preſently have to conſider.

When the inflammation is more vehement, ſuppuration may happen within the capſular ligament. Unfortunately, this is by no means an unfrequent occurrence. At length the capſular ligament ulcerates, and purulent matter is effuſed beneath the integuments. The ſkin may next ulcerate, ſo that the abſceſs is diſcharged, and the caſe ſeems to be ſomewhat benefited. The openings through which ſuch collections of matter are diſcharged, will be found, upon examination with a probe, to be the terminations of ſinuſes leading into the cavity of the joint.

A large joint ſeldom falls into a ſtate of ſuppuration, in conſequence of acute inflammation, without the conſtitution being at the ſame time ſo diſturbed, that life itſelf is greatly endangered. In the moſt violent ſtate of the inflammation, or that which is the immediate forerunner of ſuppuration, the pulſe is exceedingly frequent; but not quite ſo full and ſtrong as it would be if the part affected were of a ſtructure better adapted to reſiſt the ravages of diſeaſe. The patient's ſkin is dry and hot; he is reſtleſs and vigilant; and, in very bad caſes, delirium and coma may enſue, and end fatally.

But the rapidity with which the common inflammatory fever aſſumes in ſuch caſes the hectic type is a circumſtance which muſt not be paſſed over in ſilence. When an abſceſs has formed in a large joint, in conſequence of a ſevere attack of common inflammation, the patient immediately begins to be affected with hectic ſymptoms, and the ſtrong action attendant on the inflammatory fever ſuddenly ceaſes.

Local conſequences, even worſe than thoſe above deſcribed, may follow inflammation of a joint. As the layer of the capſular ligament reflected over the cartilages of the articulation is often inflamed, the cartilages themſelves are very liable to have the inflammation communicated to them. Parts partaking of a cartilaginous ſtructure being very incapable of bearing the irritation of diſeaſe, are often abſorbed, ſo that, in the inſtance before us, a portion, or the whole of the articular ſurface of the bones, may be left completely denuded of its natural covering. At length the heads of the bones entering into the formation of the affected joint inflame, and become carious.

Sometimes only ſuch parts as are exterior to the capſular ligament of the joint are inflamed, and in this caſe the ſymptoms are never ſo ſevere, nor ſo obſtinate, as when the complaint is more deeply ſituated. Even when ſuppuration takes place on the outſide of the capſule, the caſe is not dangerous, provided the cavity of the joint be not involved in the inflammatory attacks. Every inflammation of a large joint may generally be conſidered as a caſe of conſiderable importance; yet certainly there are inſtances where the inflammation being mild in degree, and ſimple in its nature, the danger is not urgent. However, every ſurgeon ought to be well impreſſed with the fact, that though the inflammation be originally of a healthy ſort, it is always very likely to be converted into one of a ſpecific nature, whenever there is a tendency in the conſtitution to ſcrofulous diſeaſe. A perſon, whoſe habit is ſcrofulous, may ſometimes continue, during life, exempt from any local diſeaſes of this ſpecific nature, provided he be fortunate enough to avoid all irritation of parts on which ſcrofula is moſt particularly diſpoſed to make its attack. Among ſuch parts we muſt claſs the joints, eſpecially the knee, hip, elbow, and ankle. Hence, when a joint is inflamed, how mild ſoever the affections may be, we ought never to forget, that when there is a tendency to ſcrofula in the ſyſtem, the original caſe of ſimple inflammation is very apt to be the exciting cauſe of the white ſwelling, one of the moſt ſevere and intractable diſeaſes which increaſe the catalogue of human miſeries. Hence the prudence of adopting with exactneſs whatever method of treatment may be indicated. In the following obſervations, we ſhall ſuppoſe the caſe to be that of an inflamed knee. The means beſt calculated for the relief of an inflamed joint are, generally ſpeaking, thoſe which are called antiphlogiſtic. There are few caſes in which general and topical bleeding is more neceſſary and uſeful. The violence of the inflammation, and the ſtrength, age, and pulſe of the patient, muſt determine with what freedom the lancet ſhould be employed. Leeches, however, may always be applied, and their application be repeated ſeveral times with advantage. When the leeches have fallen off, the bleeding is to be promoted by fomenting the part. The ſurgeon ſhould daily perſiſt in this method, until the acute ſtage of the inflammation has entirely ſubſided. In conjunction with this treatment, he ſhould take care to keep the joint continually ſurrounded with linen wet with the ſaturnine lotion. In no caſe of inflammation are the application of cold lotions, and the maintenance of a conſtant evaporation from the ſurface of the part affected, more ſtrikingly advantageous.

Fomentations and emollient poultices, however, ſometimes afford moſt eaſe to the patient, in which circumſtance they ought to have the preference.

Together with the foregoing means, laxative and febrifuge medicines are to be exhibited, and in a caſe of ſevere pain and loſs of ſleep, opiates.

When the acute ſtage of the inflammation has abated, the plan of treatment may be a little altered. The grand object is now to remove the effects which have been left by the preceding affection. Theſe are a thickened ſtate of the capſular ligament, and parts ſurrounding the articulation; a ſtiffneſs of the joint, and pain when it is moved; a collection of fluid in the capſule, &c. This ſtate of the complaint, when neglected, and there is a tendency to ſcrofula, may prove exceedingly obſtinate, and even terminate in an irremediable ſpecific diſtemper of the joint. When, therefore, the local redneſs, tenſion, and throbbing, and the ſymptoms of inflammatory fever ſubſide, the activity of the practitioner ought not to be relaxed. The application of a bliſter to the joint will now be found particularly efficacious, and the diſcharge ſhould be kept up for a few days with the ſavin cerate. Very large collections of fluid in the capſular ligament of the knee, great thickening about the joint, and other remaining effects of inflammation, may often, under ſuch treatment, be quite got rid of in a week or ten days.

In other caſes, in which the inflammation and its effects are ſlighter, lotions compoſed of ſpirit of wine, vinegar, and ſal ammoniac, ſuffice for the removal of any chronic complaints which may continue after the acute inflammation is at an end.

When the inflammation of a large joint like the knee is induced by a wound, the ſtomach is often much affected, and the ſymptoms may be very violent and even fatal.

Of Preternatural Cartilaginous Subſtances in Joints.—The ancients have either neglected to notice this diſeaſe in their writings, or they have not been at all acquainted with it. Ambroſe Paré is the firſt author who mentions it: he had made an inciſion, in order to diſcharge ſome fluid from the cavity of the knee-joint, when a hard, poliſhed, white body, about as large as an almond, was diſcharged from the wound. (Livre 25. chap. 15.) Since the time of Paré, the complaint has been deſcribed by numerous ſurgical authors; but the moſt valuable information on the ſubject may be found in the works of Reimarus, Morgagni, Bromfield, Ford, Deſault, Home, Hey, and Abernethy.

The external part of the extraneous ſubſtances, to which alluſion has been made, is in general of a cartilaginous conſiſtence, while their central part is frequently oſſeous. Their figure is ſubject to great variety; but they uſually have one concave ſide, and another which is convex. They are, for the moſt part, formed in the knee, and have been ſuppoſed by Reimarus, and a few other writers, to be met with in no other articulation. Morgagni, however, has ſeen oſſified bodies of this kind in the ankle-joint. Haller, alſo, diſcovered a great number of cartilaginous bodies in the articulation of the jaw, where the natural cartilages had been deſtroyed. Mr. Hey, of Leeds, mentions a caſe, in which there were two bodies of this deſcription in the elbow-joint. The largeſt preternatural cartilage perhaps ever met with is mentioned by Mr. Home, as being nearly equal in ſize to the knee-pan itſelf, and ſituated in the knee-joint of a ſoldier, belonging to the 56th regiment. The greateſt number ever known to be contained in one articulation is twenty-five. In moſt inſtances, we only find one.

Theſe preternatural cartilaginous ſubſtances are either attached to ſome part of the inſide of the joint, or they are quite unconnected, looſe, and moveable. It is only when they become ſo ſituated, as to interpoſe themſelves between two articular ſurfaces, which glide over each other in the motion of a limb, that much inconvenience commonly reſults from their preſence. While they continue by the ſide of the patella they cauſe but little trouble; but when they ſlip under the ligament of that bone, or between the ſame bone and the condyles of the femur, or between the latter bone and the head of the tibia, then they impede progreſſion, cauſe conſiderable pain, and often excite inflammation.

Much light was thrown upon the formation of looſe cartilaginous tumours in the joints, by the penetrating genius of the late Mr. Hunter. It was his belief, that a coagulum of extravaſated blood might, under certain circumſtances, be converted into an organized vaſcular ſubſtance, by the veſſels growing into it from the neighbouring living ſurface. No one doubts that the coagulating lymph has conſtantly a tendency to become vaſcular, when effuſed on the ſurface of an inflamed membrane. Now, if we take the trouble of peruſing the caſes which are related by different authors, we ſhall find, that the formation of looſe cartilaginous ſubſtances in the joints, has generally been preceded by violence done to the part, and by ſymptoms of inflammation. Of this deſcription are the examples publiſhed by Mr. Ford, M. Brochier in Default's Journal, Mr. Abernethy, and Mr. Hey. Latta mentions four inſtances which were preceded by rheumatiſm. In this ſtate, we conceive that the capſular ligament, or its delicate layer, reflected over the articular cartilages, effuſes coagulating lymph upon a part of its ſurface; that ſuch lymph ſoon becomes vaſcular and organized; and that it gradually aſſumes a ſtructure more or leſs like that of cartilage.

Looſe preternatural cartilages are moſtly attached to ſome part of the articular cavity, which does not ſuffer attrition when the joint is moved. Dr. Alexander Monro, in diſſecting the knee of a malefactor, found in the joint an oſſeous tumour, which was connected by a ligamentous pedicle with the exterior edge of the cartilage covering the external cavity of the tibia. (Edin. Eſſays, vol. iv. p. 245.) Perfect quietude is eſſential to the growth of new veſſels into coagulating lymph, and in the caſe juſt now quoted, if the exudation had taken place, where it would ſoon have been diſturbed in the motion of the limb, its organization could ſcarcely have happened. Alſo, if ſuch cartilaginous bodies were to be commonly formed on a part of the articular cavity, neceſſarily expoſed to friction in walking, &c. then patients would experience pain from the firſt. But, as they do not feel inconvenience till the tumour has become very moveable by the gradual elongation, or ſudden rupture of its pedicle, and only then when the tumour glides into a ſituation where it is pinched between the articular ſurfaces, we have a right to conclude, that moſt cartilaginous bodies of this kind grow originally in a ſituation, where they are not particularly expoſed to diſturbance in the motion of the joint. In moſt inſtances, the communication of vaſcularity muſt alſo happen, during the tenderneſs of the joint, at which period the patient naturally keeps his limb in a quiet ſtate, in order to avoid pain. After all inflammation has ſubſided, the limb is again moved with freedom; the organized coagulum is gradually looſened by the motion, and at length it only remains connected with the joint to which it was originally attached, by means of a long ſlender pedicle, through which its nutrient veſſels proceed. At laſt the pedicle breaks, and the cartilaginous ſubſtance is left quite looſe, like an extraneous body, in the cavity of the joint.

The irritation of looſe cartilages in the knee often occaſions an increaſed quantity of fluid in the capſular ligament, but this is not invariably the caſe. When the irritation is ſuch as to induce a degree of heat and tenderneſs in the joint, there is uſually a preternatural quantity of the ſynovia ſecreted: when pain and inconvenience have not lately been felt, this fluid is generally not more abundant, than in the natural ſtate of the joint.

With reſpect to the treatment of theſe caſes, we are not acquainted with any certain means of freeing the patient from the inconveniences of the diſeaſe, if we except making an inciſion into the joint, for the purpoſe of extracting the cartilaginous ſubſtance. To this plan, the danger attendant on all wounds of ſo large an articulation as the knee is a very ſerious objection. Hence, Middleton and Gooch tried another method, which was to conduct the extraneous body into a ſituation where it produced no pain, and to retain it in that poſition a long time, by means of bandages, under the idea, that the cartilaginous ſubſtance would adhere to the contiguous parts, and occaſion no future trouble. Theſe ſurgeons appear at leaſt to have thus afforded temporary relief.

Mr. Hey, impreſſed with a juſt ſenſe of the dangerous ſymptoms, which have occaſionally reſulted from the moſt ſimple wounds penetrating the knee-joint, tried the efficacy of a laced knee-cap, and the caſes which he has adduced clearly demonſtrate, that the benefit thus obtained is not tranſient, at leaſt as long as the patient continues to wear the bandage. In one caſe, the method had been tried, for ten years, with all the ſucceſs which the patient could deſire.

All things conſidered, it is our decided opinion, that the effect of a knee-cap, or of a compreſs and roller, ought generally to be tried before having recourſe to the knife, ſuppoſing the cartilaginous ſubſtance can be placed in a ſituation where it gives no pain, and admits of being compreſſed. But doubtleſs there are inſtances, in which it is the duty of the ſurgeon to operate. If a man be deprived of his livelihood by not being able to uſe his knee; if he cannot, or will not, take the trouble of wearing a bandage; if he be urgently deſirous of running the riſk of the operation, after circumſtances have been impartially explained to him; if a bandage fail in affording ſufficient relief; and laſtly, if exceſſive pain, ſevere inflammation of the joint, and lameneſs, be frequently brought on by the diſeaſe; the employment of the knife ſeems juſtifiable and proper. It is very certain, that ſucceſs has generally attended the operation; but ſmall as the hazard may be of loſing the limb, and even life, in the attempt to get rid of the complaint; yet, ſince the inconveniences of the diſeaſe are in moſt caſes very bearable, and are alſo capable of palliation by means of a bandage, endangering the limb and life in any degree muſt appear to many perſons contrary to the dictates of prudence.

We have no inſtance recorded, where there was a neceſſity for removing a cartilaginous tumour from any joint but the knee.

The diſeaſe being often attended with a degree of heat and tenderneſs about the joint, there can exiſt no doubt of the propriety of keeping the patient in bed a day or two before he ſubmits to the operation, the danger of which is in a great meaſure proportioned to the ſubſequent inflammation. When the attempt to heal the wound by the firſt intention ſucceeds, much of the hazard is alſo paſt. Therefore, the joint ſhould be brought into as quiet a ſtate as poſſible before the inciſion is practiſed, and beſides a little confinement, the ſurgeon ſhould direct leeches and cold ſaturnine lotions to be applied to the knee, and an opening draught or two to be taken.

As the looſe piece of cartilage may, in general, be moved round the joint, the ſurgeon frequently has it in his power to chooſe the place where he will make the inciſion. Ford, Latta, and others have made the wound on the outſide of the joint. Deſault uſed to bring the looſe cartilage to the inner ſide of the articulation, againſt the attachment of the capſular ligament, and then make the cut in that ſituation. Mr. Abernethy has recommended bringing the extraneous ſubſtance to the outſide of the internal condyle of the os femoris, and dividing the capſular ligament at that part. Mr. Ruſſell adviſes us to puſh the moveable body upwards, on the inſide of the thigh, in order that the inciſion may be as diſtant as poſſible from the moving ſurface of the joint. Mr. Hunter alſo preferred removing theſe looſe bodies at the upper part of the joint, becauſe there the bag, which contains the ſynovia, has leſs of the nature of a capſular ligament.

But whatever place may be choſen for the inciſion, it is of great conſequence that an aſſiſtant prevent the looſe cartilage from ſlipping away, leſt it ſhould not eaſily be found again, and the purpoſe of the operation be fruſtrated. It is clear, that if the capſular ligament were wounded when an accident of this kind occurred, the patient would be expoſed to all the danger of the operation, without any chance of being benefited by it.

All operators have followed the plan of drawing the integuments to one ſide before making the inciſion, ſo that as ſoon as the exciſion of the cartilage is accompliſhed, the wound in the capſular ligament may become immediately covered with ſkin. Thus the bad effects of the cavity of the joint being expoſed, are materially prevented. The piece of cartilage, when brought into view, is to be directly extracted by means of a tenaculum.

The ſkin is then to be brought over the opening in the capſular ligament; the external wound is to be cloſed with ſticking plaſter; cold lotions are to be applied to the knee; and every antiphlogiſtic meaſure adopted, which may ſeem prudent and neceſſary.

Experience has further proved, that the patient is not completely out of danger as ſoon as the wound is united; and that he ought, for ſome time longer, to keep the limb at reſt. See Bromfield's Chirurgical Caſes and Obſervations, vol. i. p. 335, 336.

Of Hydrops Articuli, or Dropſy of the Joints.—This diſeaſe conſiſts of an accumulation of water in the capſular ligament of a joint, and is very analogous to the hydrocele, or collection of an aqueous fluid in the tunica vaginalis teſtis. Both theſe complaints, indeed, are alike, in not ariſing from a general dropſical affection of the conſtitution, the patient being frequently in other reſpects quite ſound. There are, it is true, a few exceptions to the latter part of this obſervation. The knee is, of all joints, the moſt liable to the diſeaſe, perhaps on account of the largeneſs and looſeneſs of its capſular ligament.

The preciſe cauſes of hydrops articuli are often beyond the reach of inveſtigation. The diſorder, however, is frequently preceded by ſevere rheumatic affections, fevers, and local violence. In moſt caſes a fluctuation is very diſtinguiſhable, unleſs the joint be uncommonly diſtended. When the limb, alſo, is extended, ſo as to relax the extenſor muſcles of the leg, the knee-pan may be made to riſe up, by preſſing the tumour, and a fulneſs may then be diſcerned on each ſide of that bone. The complaint is in general unattended with ſerious pain, though ſome uneaſineſs, and a ſenſe of ſtiffneſs are experienced.

In conſidering the treatment of this, as well as of moſt other diſeaſes, it behoves us to pay eſpecial attention to the cauſes where they are diſcoverable, the mere removal of them being often of itſelf capable of effecting a cure. Thus, when hydrops articuli occurs during the debility conſequent to typhoid and other fevers, the complaint can hardly be expected to get well till the ſtrength of the conſtitution is, in ſome degree reſtored. The connection between the local and conſtitutional diſorder is well illuſtrated in a caſe which Mr. Ruſſell has related, and in which every local remedy was tried without avail: the diſeaſe, which would not yield as long as the debility conſequent to a typhus fever laſted, got well ſpontaneouſly immediately when the patient regained his ſtrength. On Morbid Affections of the Knee, p. 192.

In ordinary examples hydrops articuli is quite a local malady, unconnected with any diſorder of the conſtitution, and may be diſperſed by topical treatment. One of the moſt effectual means for this purpoſe, is the application of a bliſter, which ſhould be kept open with the ſavin cerate. The operation of the bliſter may alſo be very materially promoted by the preſſure of a bandage. In ſome inſtances the action of the abſorbents may be ſufficiently excited by moderate exerciſe, and frictions with flannel impregnated with the ſteam of vinegar, or by electricity, and rubbing the joint with camphorated mercurial ointment. The patient ſhould likewiſe be purged with calomel, or kali acetatum, unleſs any particular reaſons forbid.

Surgical writers inform us of caſes, which reſiſt common treatment, are attended with immoderate diſtention, and even with ſuch irritation upon a weak conſtitution, as ſeriouſly impairs the health. Here, the ſurgeon would be juſtified in making a ſmall puncture into the joint, in order to diſcharge the fluid. Care ſhould be taken to make the opening no larger than neceſſary, and to draw the integuments to one ſide, before introducing the lancet, or trocar, ſo that the wound in the capſular ligament, as ſoon as the operation is finiſhed, may become covered with ſkin.

Exciſion of Diſeaſed Joints.—In the year 1782, Mr. Park, a ſurgeon at Liverpool, made the propoſal of totally extirpating many diſeaſed joints, ſo as to do away the neceſſity of cutting off limbs, which might ſtill be of more uſe to the patients than any artificial contrivance. It was his plan to effect an entire removal of the heads of ſuch bones as compoſed the diſeaſed articulation, and then to make the ſawn extremities of the bones grow together, like the ends of a fracture.

After undertaking ſome experiments upon the dead ſubject, Mr. Park, in 1781, performed the operation of extirpating the diſeaſed knee of a ſtrong robuſt ſailor, aged 33. The method purſued was much like that which had been previouſly tried upon the dead ſubject, and which was as follows: An inciſion began about two inches above the upper end of the patella, and extended about as far below its lower part. Another one was made acroſs this at right angles, immediately over the patella, down to the bone, and nearly half round the limb, the leg being in an extended ſtate. The lower angles, formed by theſe inciſions, were raiſed, ſo as to lay bare the capſular ligament; the patella was then taken out; the upper angles were raiſed, ſo as fairly to denude the head of the femur, and to allow a ſmall catling to be paſſed acroſs the poſterior flat part of the bone, immediately above the condyles, care being taken to keep one of the flat ſides of the point of the inſtrument quite cloſe to the bone all the way. The catling being withdrawn, an elaſtic ſpatula was introduced into its place, for the purpoſe of protecting the ſoft parts during the ſawing of the thigh-bone. The head of the bone, thus ſeparated, was carefully diſſected out; the head of the tibia was then eaſily turned out and ſawn off, and as much as poſſible of the capſular ligament diſſected away. The quantity of bone removed in the operation was a very little more than two inches of the thigh-bone, and rather more than one inch of the tibia. The only large artery divided was one on the front of the knee, and it ceaſed to bleed before the operation was concluded; but the ends of the bones bled very freely. To keep the redundant integuments from falling inwards, and the edges of the wounds in tolerable contact, a few ſutures were uſed. The dreſſings were light and ſuperficial, and the limb was put in a tin caſe, which was long enough to receive the whole member, from the ankle to the trochanter major.

We learn from Mr. Park, that afterwards many troubleſome circumſtances occurred, ariſing chiefly from the difficulty of keeping the limb in a fixed poſition, the great depth of the wound, and the abſceſſes and ſinuſes which were formed in the part. The firſt ſymptoms, however, were not at all dangerous. But the patient was obliged to keep his bed nine or ten weeks, and it was many months before the cure was complete. The man afterwards went to ſea, and ſo uſeful was his limb, that he was able to do his duty extremely well.

Mr. Park made another attempt to extirpate a diſeaſed knee, but it was leſs favourable, as the patient lingered a few months after the operation, and died.

About the ſame time that Mr. Park made his propoſal, a ſimilar plan was ſuggeſted by P. F. Moreau, a French ſurgeon, and tried in ſeveral inſtances, upon the knee, elbow, &c. by himſelf and his ſon.

The exciſion of diſeaſed joints ſeems, at preſent, to have no advocates among ſurgeons of judgment and experience. A full relation of all that is known on the ſubject has been lately publiſhed by Dr. Jeffrays, in a work entitled "Caſes of the Exciſion of Carious Joints." In this book may be found a deſcription of a very ingenious ſaw for facilitating the operation. The inſtrument is conſtructed with joints, like a watch chain, ſo as to allow itſelf to be drawn behind a bone with a crooked needle, and be calculated for cutting the bone from behind forwards, without injuring the ſoft parts. It was made by Mr. Richards, who was aſſiſted by his nephew, the preſent Mr. Richards, of Brick Lane, London. In placing the ſaw under the bone, its cutting edge is to be turned away from the fleſh. Handles are afterwards hooked on the inſtrument.

The reaſons which keep the practice of cutting out diſeaſed joints from being imitated, are, in our opinion, of the moſt invincible kind. We believe that it is only right to amputate a limb, on account of a diſeaſed joint, when the patient's health is ſo reduced, that it cannot any longer bear the irritation of the local diſeaſe, and that as long as the ſtrength holds out, the propriety of endeavouring to cure the diſeaſe, and preſerve the limb, is dictated by every principle of good ſurgery, as well as humanity. If it be only in hopeleſs circumſtances, and in a reduced ſtate of the patient, that we are to turn our minds to the uſe of the knife, it ſeems improbable that a patient, after being greatly reduced by hectic ſymptoms, would in general recover from ſo bold and terrible an operation, as that of diſſecting away the whole of the knee-joint. If ſome few ſhould eſcape with life and limb preſerved, would the bulk of perſons treated in this manner have the ſame good fortune?

The extirpation of ſo large an articulation as the knee cannot be compared with the operation of amputation, in point of ſimplicity and ſafety. The chief objections are founded, however, not upon the pain, nor difficulty of the operation, but upon the great length of time which the healing of the wound requires, and which, in the firſt caſe recorded by Mr. Park, was no leſs than eight months. His ſecond example, as we have already mentioned, ended fatally. Moreau's patient, though much debilitated, eſcaped the firſt dangers conſequent to the operation; and "after three months confinement, the patient was in ſuch a ſtate, that Moreau expected he would be able to walk upon crutches in another month or ſix weeks!" In the mean time the young man died of a dyſentery. Allowing the exciſion of the knee to be followed by all poſſible ſucceſs, few men of judgment will alſo acknowledge, that the advantage of having a mutilated, ſhortened, ſtiff limb, inſtead of a wooden leg, is an adequate compenſation for the more painful operation that has been endured, and the greater riſk that has been run.

Many of the foregoing obſervations were originally publiſhed in a Treatiſe on the Diſeaſes of the Joints by S. Cooper, 1807.

Joints, in *Mining*, are applied to the vertical fiſſures, or cutters, by which moſt of the ſtrata are divided nearly vertically, into ſeparate blocks and pieces. In the limeſtone quarries in Derbyſhire, two very diſtinct kinds of joints are noticed in the rock, ſome that are peculiar to the particular beds of ſtone, (the fiſſures of W. Martin,) and rarely ſink through more than two or three beds; and others, that break through all the beds of limeſtone, and form a perfectly ſtraight wall often to the face of their quarries; theſe laſt ſeem perfectly allied to mineral veins, though often not more than the eighth, or a quarter of an inch wide, and have their ſides ſkirted with fluor, or calcareous ſpar, or barytes, and are poliſhed, or ſhew thicker ſides in ſome inſtances, and often theſe joints contain ſmall ſpecks of lead ore; while it is very rare for the other, or partial joints, to contain ſpar or ore; theſe kinds of joints, when cloſe filled with ſpar, ſo as to cement the parts of the rock firmly together again, ſeem to anſwer to the cotemporaneous veins of Werner; and the ſpar-joints of other writers; Mr. William Martin calls them rifts, Outlines, p. 171. Quarrymen ſometimes apply the term *joint* to the partings or thin way-boards which ſeparate the different thin ſtrata or beds of ſtone in a rock; but properly, theſe are called bed-joints, or ſtrata-ſeams. The definition which M. Werner gives of ſtrata, *viz.* "thoſe parts of a rock which lie between *parallel rents and fiſſures*," (Tranſl. of New Theory of Veins, p. 2.), is much too general, as it may include both the kinds of joints above-mentioned, and the impropriety alſo is ſtriking, of applying the term *rent* to the bed-joints of a rock, or ſemi-ſtrata of Martin; with ſuch vague ideas as theſe, it is no wonder that many obſervers have miſtaken the cutters or joints of thick ſtrata, that happen to range parallel, for bed-joints or ſtrata-ſeams, and deſcribed ſtrata as vertical, which are in reality horizontal, or near it.

Joints, in *Architecture*, denote the ſeparations between the ſtones; which are filled with mortar, plaſter, or cement.

Joint, in *Carpentry*, &c. is applied to ſeveral manners of aſſembling, or fitting, pieces of wood together. Thus we ſay, a dove-tail joint, &c. See Joinery, Mortise, Dove-tail, &c.

Joint, *Univerſal*, in *Mechanics*, an excellent invention of Dr. Hook, adapted to all kinds of motions and flexures; of which he has given a large account in his Cutlerian Lectures, printed in 1678. This ſeems to have given occaſion to the gimbols uſed in ſuſpending the ſea-compaſs, the mechaniſm of which is the ſame with that of Deſaguliers's rolling lamp.

Joint, in *Ship Building*, a term ſignifying the juncture of the frame-timbers, which is repreſented by a line, whereby the ſhape of the veſſel is determined at the ſtations of the frames, to which the moulds are made for forming the various timbers, and although the frame is compoſed of a double ſet of timbers, yet they are generally cloſe enough that the mould, made at the joint or middle, gives the ſhape of the foreſide of the one, and the aftſide of the other.

Joint *Action*, in *Law*. In perſonal actions ſeveral wrongs may be joined in one writ; but actions founded upon a tort, and on a contract, cannot be joined; for they require different pleas and different proceſs.

Joint-*battery*. See Battery.

Joint-*executors*, in *Law*, are two or more perſons appointed ſuch by will: in which caſe they are accounted but as one ſingle perſon, ſo that the actions done by one of them are taken to be the acts of all, becauſe they all repreſent the perſon of the teſtator; thus, where two joint-executors are poſſeſſed of a leaſe for years, in right of their teſtator, one of them may ſell the term without the other's joining; and in like manner, where one joint-executor gives a releaſe, the others are bound by it, each having an authority over the whole eſtate; but a joint-executor is not charged with the acts of his companion, any farther than he is actually poſſeſſed of the goods of the teſtator: however, if joint-executors enter into an agreement, that each ſhall intermeddle with particular parts of the teſtator's eſtate, in that caſe each becomes chargeable for the whole by agreement. It has been held, that two joint-executors cannot urge ſeparate pleas, becauſe their teſtator, if living, on an action brought againſt him, could have been allowed but one plea; and that, if all the executors are not named in any action brought by joint-executors, the action will abate. As to legatees, the receipt of one executor charges not the other. See EXECUTOR.

JOINT-*lives*, denote lives that continue during the ſame time, or that exiſt together. See LIFE-*annuities*.

JOINT-*rule*. See *Carpenters' joint* RULE.

JOINT-TENANCY, in *Law*, ſee the next article.

JOINTENANTS, or JOINT-TENANTS, in *Law*, thoſe who come to, and hold, lands and tenements by one title *pro indiviſo*, or without partition.

Theſe are diſtinguiſhed from *ſole*, or ſeveral-tenants, from *parceners* and from *tenants in common*. Anciently they were called *participes*, and not *hæredes*. See SEVERALTY.

An eſtate in joint-tenancy is where lands or tenements are granted to two or more perſons to hold in fee-ſimple, fee-tail, for life, for years, or at will. This is ſometimes called an eſtate in "jointure," which word, as well as the other, ſignifies an union or conjunction of intereſt. The "creation" of an eſtate of this kind depends upon the wording of the deed or deviſe by which the tenants claim title; for this eſtate can only ariſe by purchaſe or grant, that is, by the act of the parties, and never by the mere act of the law. Now, if an eſtate be given to a plurality of perſons, without adding any reſtrictive, excluſive, or explanatory words, as if an eſtate be granted to A and B and their heirs, this makes them immediately joint-tenants in fee of the lands. For the law interprets the grant ſo as to make all parts of it take effect, which can only be done by creating an eſtate in them both. As, therefore, the grantor has thus united their names, the law gives them a thorough union in all other reſpects. The "properties" of a joint eſtate are derived from its unity; and this unity is fourfold; *viz.* the unity of intereſt, the unity of title, the unity of time, and the unity of poſſeſſion; or in other words, joint-tenants have one and the ſame intereſt, accruing by one and the ſame conveyance, commencing at one and the ſame time, and held by one and the ſame undivided poſſeſſion. With regard to unity of *intereſt*, it may be obſerved, that one joint-tenant cannot be entitled to one period of duration, or quantity of intereſt in lands, and the other to a different; one cannot be tenant for life, and the other for years; one cannot be tenant in fee, and the other in tail. (Co. Litt. 188.) But if land be limited to A and B for their lives, this makes them joint-tenants of the freehold; if to A and B and their heirs, it makes them joint-tenants of the inheritance. (Litt. § 277.) If land be granted to A and B for their lives, and to the heirs of A; here A and B are joint-tenants of the freehold during their reſpective lives, and A has the remainder of the fee in ſeveralty; or, if land be given to A and B, and the heirs of the body of A; here both have a joint eſtate for life, and A hath a ſeveral remainder in tail. (Litt. § 285.) Joint-tenants muſt alſo have an unity of *title*; their eſtate muſt be created by one and the ſame act, whether legal or illegal; as by one and the ſame grant, or by one and the ſame diſſeiſin. (Litt. § 278.) Joint-tenancy cannot ariſe by deſcent or act of law; but merely by purchaſe, or acquiſition by the act of the party; and, unleſs that act be one and the ſame, the two tenants would have different titles; and if they had different titles, one might prove good, and the other bad, which would abſolutely deſtroy the jointure. There muſt alſo be an unity of *time*; their eſtates muſt be veſted at one and the ſame period, as well as by one and the ſame title. As in caſe of a preſent eſtate made to A and B; or a remainder in fee to A and B after a particular eſtate; in either caſe A and B are joint-tenants of this preſent eſtate, or this veſted remainder. But if, after a leaſe for life, the remainder be limited to the heirs of A and B; and during the continuance of the particular eſtate A dies, which veſts the remainder of one moiety in his heir; and then B dies, whereby the other moiety becomes veſted in the heir of B; now A's heir and B's heir are not joint-tenants of this remainder, but tenants in common; for one moiety veſted at one time, and the other moiety veſted at another. (Co. Litt. 188.) Moreover, in joint-tenancy there muſt be an unity of *poſſeſſion*. Joint-tenants are ſaid to be ſeiſed "per my et per tout," by the half or moiety, and by all; that is, they each of them have the entire poſſeſſion, as well of every *parcel* as of the *whole*. (Litt § 288. 5 Rep. 10.) And therefore, if an eſtate in fee be given to a man and his wife, they are neither properly joint-tenants, nor tenants in common: for huſband and wife being conſidered as one perſon in law, they cannot take the eſtate by moieties, but both are ſeiſed of the entirety, "per tout et non per my;" the conſequence of which is, that neither the huſband nor the wife can diſpoſe of any part without the aſſent of the other, but the whole muſt remain to the ſurvivor. (Litt. § 665. Co. Litt. 187. 2 Vern. 120. 2 Lev. 39.) From theſe principles we may deduce other incidents pertaining to the joint-tenant's eſtate. If two joint-tenants let a verbal leaſe of their land, reſerving rent to be paid to one of them, it ſhall enure to both, in reſpect of the joint-reverſion. (Co. Litt. 214.) If their leſſee ſurrenders his leaſe to one of them, it ſhall alſo enure to both, becauſe of the privity or relation of their eſtate. (Co. Litt. 192.) For the ſame reaſon, livery of ſeiſin, made to one joint-tenant, ſhall enure to both of them (Co. Litt. 49.); and the entry, or re-entry, of one joint-tenant, is as effectual in law as if it were the act of both. (Co. Litt. 319. 364.) In all actions, alſo, relating to their joint-eſtate, one joint-tenant cannot ſue or be ſued without joining the other. (Co. Litt. 195.) But if two or more joint-tenants be ſeiſed of an advowſon, and they preſent different clerks, the biſhop may refuſe to admit either: becauſe neither joint-tenant hath a ſeveral right of patronage, but each is ſeiſed of the whole; and if they do not both agree within ſix months, the right of preſentation ſhall lapſe. But the ordinary may, if he pleaſes, admit a clerk preſented by either, that divine ſervice may be regularly performed; and if the clerk of one joint-tenant be ſo admitted, this ſhall keep up the title in both of them. (Co. Litt. 185.) It is held alſo, that one joint-tenant cannot have an action againſt another for treſpaſs, in reſpect of his land (3 Leon. 262.); for each has an equal right to enter on any part of it. But one joint-tenant is not capable by himſelf of doing any act which may tend to defeat or injure the eſtate of the other, as to let leaſes, or grant copy-holds (1 Leon. 234.); and if any waſte be done, which tends to the deſtruction of the inheritance, one joint-tenant may have an action of waſte againſt the other, by conſtruction of the ſtatute Weſtm. 2. c. 22. (2 Inſt. 403.) So likewiſe, though at common law no action of account lay for one tenant againſt another, unleſs he had conſtituted him his bailiff or receiver (Co. Litt. 200.); yet now by the ſtatute 4 Anne, c. 16. joint-tenants may have actions of account againſt each other, for receiving more than their due ſhare of the profits of the tenements held in joint-tenancy. From the ſame principle alſo ariſes the remaining grand incident of joint eſtates; *viz.* the doctrine of *ſurvivorſhip*; which ſee.

An eſtate in joint-tenancy may be *ſevered* and *deſtroyed*, by deſtroying any of its conſtituent unities. The firſt, indeed, cannot be effected by any ſubſequent tranſaction. But the joint-tenant's eſtate may be deſtroyed without any alienation, by merely diſuniting their *poſſeſſion*. Hence, if two joint-tenants agree to part their lands, and hold them in ſeveralty, they are no longer joint-tenants, and the right of ſurvivorſhip is by ſuch ſeparation deſtroyed. (Co. Litt. 188. 193.) By common law all the joint-tenants might agree to make partition of the lands; but one of them could not compel the other ſo to do (Litt. § 290.); but now by the ſtatutes 31 Hen. VIII. c. 1. and 32 Hen. VIII. c. 32. joint-tenants, either of inheritance or other leſs eſtates, are compellable by writ of partition to divide their lands. Again, the jointure may be deſtroyed by deſtroying the unity of *title*. As if one joint-tenant alienes and conveys his eſtate to a third perſon, the joint-tenancy is ſevered, and turned into tenancy in common. (Litt. § 292.) But a deviſe of one's ſhare by will is no ſeverance of the jointure; for no teſtament takes effect till after the death of the teſtator, and by ſuch death the right of the ſurvivor, which accrued at the original creation of the eſtate, and has therefore a priority to the other, is already veſted. (Litt. § 287.) It may be alſo deſtroyed by deſtroying the unity of *intereſt*. And therefore, if there be two joint-tenants for life, and the inheritance is purchaſed by or deſcends upon another, it is a ſeverance of the jointure. (Cro. Eliz. 470.) In like manner, if a joint tenant in fee makes a leaſe for life of his ſhare, this defeats the jointure, for it deſtroys the unity both of title and intereſt. (Litt. § 302, 303.) And whenever, or by whatever means the jointure ceaſes or is ſevered, the right of ſurvivorſhip the ſame inſtant ceaſes with it. (Co. Litt. 108.) Yet, if one of theſe joint-tenants alienes his ſhare, the two remaining tenants ſtill hold their parts by joint-tenancy and ſurvivorſhip (Litt. § 294.); and if one of three of theſe joint-tenants releaſes his ſhare to one of his companions, though the joint-tenancy is deſtroyed with regard to that part, yet the two remaining parts are ſtill held in jointure (Litt. § 304.); for they ſtill preſerve their original conſtituent unities.

Things perſonal may belong to their owners, not only in ſeveralty, but alſo in joint-tenancy, and in common as well as real eſtates. Thus if a houſe, or other perſonal chattel, be given to two or more abſolutely, they are joint-tenants of it; and, unleſs the jointure be ſevered, the ſame doctrine of ſurvivorſhip ſhall take place as in eſtates of lands and tenements. (Litt. § 282. 1 Vern. 482.) The king cannot have a joint property with any perſon in one entire chattel, or ſuch a one as is not capable of diviſion or ſeparation; but where the titles of a king and a ſubject concur, the king ſhall have the whole. Blackſt. Com. b. ii.

JOINT-*water*, a term uſed by our farriers, for what the old writers in medicine have called hydarthros; a running of a clear ichor from the joints, when they are either wounded or ulcerated: it is common in diſeaſes of horſes.

JOINTEE, in the *Manege*. See HANDFUL.

JOINTRESS, or JOINTERESS, ſhe that hath an eſtate ſettled upon her by her huſband, to hold during her life, if ſhe ſurvives him.

JOINTURE, in *Law*, a covenant whereby the huſband, or ſome friend in his behalf, makes over to his wife, on condition of marriage, certain lands and tenements for the term of her life, or otherwiſe, in lieu of dower.

Others define jointure a bargain and contract of livelihood, adjoined to the contract of marriage, being a competent proviſion of freehold lands or tenements, &c. for the wife, during her life at leaſt, to take effect in profit or poſſeſſion, after the death of her huſband, if ſhe herſelf is not the cauſe of the extermination or forfeiture of it.

And to make a perfect jointure within the ſtatute of 27 Hen. VIII. c. 10. to bar dower, ſeveral things are to be obſerved. 1. It muſt be made to take effect for the life of the wife in poſſeſſion or profit, preſently after the deceaſe of her huſband. 2. It muſt be for the term of her own life, or a greater eſtate; but it may be limited to continue no longer than ſhe remains a widow, &c. 3. It muſt be made for herſelf, and to none other in truſt for her. 4. It is to be expreſſed to be in ſatisfaction of her whole dower, and not a part of it. 5. It may be made before or after marriage: if it be made before, the wife cannot waive it, and claim her dower at common law (4 Rep. 1, 2.); but if it be made after marriage, ſhe has her election, after the huſband's death, and may either accept it, or refuſe it, and betake herſelf to her dower at common law; for ſhe was not capable of conſenting to it during coverture, unleſs the jointure be made by act of parliament. After the death of her huſband, the wife may enter into her jointure, and is not driven to a real action, as ſhe is to recover dower by the common law; and upon a lawful eviction of her jointure, ſhe ſhall be endowed according to the rate of her huſband's lands, whereof ſhe was dowable at common law.

A wife's jointure ſhall not be forfeited by the treaſon of the huſband (Co. Litt. 37.); but feme-coverts, committing treaſon or felony, may forfeit their jointures, and being convict of recuſancy, they ſhall forfeit two parts in three of their jointures and dower, by 3 Jac. I. c. 4.

JOINVILLLE, JOHN SIRE DE, in *Biography*, a French hiſtorian, born in the early part of the thirteenth century, made a conſiderable figure in the court of Lewis IX. This prince he followed in all his military expeditions, and aſſiſted him alſo in the adminiſtration of juſtice. One of the duties which he had to perform, was to hear the pleas of applicants at the palace gate, and to report them to his majeſty, and alſo to inveſtigate the truth of the allegations. When Lewis took the croſs, and made his expedition into Egypt in 1249, Joinville, inſtigated by the martial ſpirit and devotion of the age, attended him with a train of followers ſuited to his rank, and his narrative of this enterprize in his life of Lewis, is one of the moſt curious and valuable records of that age. The hiſtorian ſhared his ſovereign's captivity, as well as the dangers which they all incurred from the common enemy. He returned in ſafety, and was ſo much impreſſed with the danger and impolicy of theſe expeditions, that he made no ſcruple of condemning thoſe who adviſed Lewis to undertake his ſecond cruſade, and excuſed himſelf from accompanying the king, on the pretext of having been ruined by the firſt. Joinville's hiſtory was completed in the year 1309, when the author, according to Gibbon, muſt have been more than ninety years of age: it is a faithful detail of the facts which occurred under his own obſervation. "A monkiſh hiſtorian ſhould have been content to applaud the moſt deſpicable part of his (the king's) character; but the noble and gallant Joinville, who ſhared the friendſhips and captivity of Lewis, has traced with the pencil of nature the free portrait of his virtues as well of his failings." The moſt valuable edition of this work is that of Du Cange in 1688; but the text of the Paris edition in 1761 is reckoned the moſt pure and authentic. It has been lately tranſlated into the Engliſh, and publiſhed by Mr. Johnes of Hafod. Moreri, Gibbon.

Joinville, in *Geography*, a town of France, in the department of the Upper Marne, and chief place of a canton, in the diſtrict of Waſſy, ſituated on the Marne; 15 miles S.E. of St. Dizier. The place contains 3086, and the canton 7476 inhabitants, on a territory of 145 kiliometres, in 15 communes. N. lat. 48° 27′. E. long. 5° 13′.

JOIRE, St., a town of France, in the department of Mont Blanc; 4 miles S.E. of Chambery.—Alſo, a town in the ſame department; 15 miles S.E. of Geneva.

JOISTS, or Joysts, in *Architecture*, thoſe pieces of timber framed into the girders and ſummers on which the boards of floors are laid.

Joiſts are from ſix to eight inches ſquare, and ought ſeldom to lie at a greater diſtance from each other than ten or twelve inches; nor ought they ever to bear at a greater length than ten feet; or to lie leſs into the wall than eight inches. See Chimney.

Sometimes the carpenters furr their joiſts, as they call it; that is, they lay two rows of joiſts, one over the other.

JOKALAY, in *Geography*, a town of Sweden, in the government of Abo; 22 miles N.W. of Abo.

JOKES. See Jesting.

JOKI, in *Geography*, a town of Japan, in the iſland of Niphon; 50 miles N. of Meaco.

JOKIOS, a town of Sweden, in the province of Tavaſtland; 28 miles W.S.W. of Tavaſthus.

JOKKAS, a town of Sweden, in the province of Tavaſtland; 107 miles N.E. of Tavaſthus.

JOKKATO, a town of Africa, in the kingdom of Barra.

JOKO, a town of Africa, in Kaarta. N. lat. 14° 30′. W. long. 8°.

JOKOMI, a town of Japan, in the iſland of Niphon; 25 miles N. of Jedo.

JOLCOS, or, as Homer calls it, *Jaolcos*, in *Ancient Geography*, a town of Theſſaly, in Magneſia, at the lower extremity of the Pelaſgic gulf, ſeven ſtadia from Demetrias and the ſea. It was anciently conſiderable, and had a famous port. Pliny ſays that Adraſte at this place invented the funeral games; and Strabo reckons it in the number of thoſe towns which were deſtroyed in order to people the town of Demetrias. Jaſon, the ſon of Eſon, was king of Jolcos, and from hence the Argonauts took their departure; and it is ſaid that on their return they found the town in the poſſeſſion of Pelias, brother of Jaſon, who had him put to death.

JOLIAN, in *Geography*, a town of Hindooſtan, in Guzerat; 20 miles N. of Gogo.

JOLIBA, denoting, in the language of the Negroes, "great water," is a name which they give to the river Niger, called by the Moors "Nil il Abud," or the river of Slaves. When Mr. Park, in his intereſting Tour, firſt diſcovered this river, it appeared to him as broad as the Thames at Weſtminſter, and flowing majeſtically, but ſlowly, from weſt to eaſt, through the middle of a very extenſive town, called Sego. This enterpriſing and ingenious traveller purſued the courſe of the Joliba from W. long. 5° 30′ to Silla, long. 1° 30′, the utmoſt extent of his expedition. See Guin and Niger.

JOLITHUS, in *Botany*, from ιον, *a violet*, and λιϑος, *a ſtone*, a cryptogamic plant, referred by Linnæus to the genus *Byſſus*, by ſome others to that of *Lichen*. It is found in the form of broad crimſon patches, when moiſt, ſmelling ſtrongly of violets, or rather of Orris root, clothing the ſurface of ſtones in clear ſprings, as at Holywell in Flintſhire, Tunbridge, and other places. Nothing is known concerning the fructification.

JOLLONE Key, in *Geography*, a ſmall iſland among the Bahamas. N. lat. 26° 12′. W. long. 77° 2′.

JOLO, or Soere Carta, a town of Java, and capital of the kingdom of Soeſoehoenam.

JOLUCAR, a town of Spain, in the province of Granada; 7 miles N.E. of Motril.

JOLUT, an iſland near the weſt coaſt of Eaſt Greenland. N. lat. 60° 56′. W. long. 46° 50′.

JOLY, Claude, in *Biography*, a French writer, was born at Paris in 1607. He was precentor of the cathedral of Paris, and died in that city in the year 1700. He was author of a book entitled "Maxims for the Education of a Prince," which was condemned by the judicature of Paris, and was burnt by the hands of the common hangman in 1665. He likewiſe wrote ſeveral other pieces, chiefly theological.

Joly, Guy, a French writer of memoirs, was counſellor to the king, and ſyndic of the renters of the hotel de ville, in Paris. He was attached to the cardinal de Retz, whom he followed, for a conſiderable time, in all his various fortunes. After the return of that miniſter from Rome, Joly quitted him on account of want of mutual confidence. He drew up "Memoirs from 1648 to 1665," in two volumes 12mo. which are chiefly an abridged account of what the cardinal himſelf has recorded in his own memoirs: but they are written in a more exact ſtyle than thoſe of the cardinal, and contain many additional curious facts. Joly was engaged to defend the rights of the queen, and drew up "Remarks on Two Treatiſes written by Peter Stockmans in oppoſition to her Claims on Brabant and the Low Countries." He was author of another work, entitled "Intrigues of Peace, or Negociations at Court by the Friends of M. le Prince, after his retreat in Guienne." Moreri.

Joly, in *Geography*, a port on the S. coaſt of Nova Scotia.

JOMELLI, Nicolo, in *Biography*, one of the moſt intelligent, learned, and affecting dramatic compoſers of modern times, was born at Avellino, a town about twenty-five miles from Naples, in which city he had his muſical education under Leo and Durante. The firſt opera to which we find his name, is "Riccimero Rè de' Goti," compoſed for the Argentina theatre at Rome, 1740: and between that period and 1758, he compoſed for that city fourteen operas, beſides others for Venice and different Italian theatres.

From 1758 to about 1768, he reſided in Germany, being engaged in the ſervice of the duke of Wurtemburg, at Stuttgardt, or rather at Ludwigſburg, his new capital, where Jomelli's works were performed. Here he produced a great number of operas and other compoſitions, by which he acquired great reputation, and totally changed the taſte of vocal muſic in Germany. On his return to Italy, he left all theſe productions behind him, upon a ſuppoſition that he ſhould again reſume his ſtation at Ludwigſburg, after viſiting his native country. But as he never returned thither to claim theſe compoſitions, they fell into the hands of his patron, the duke of Wurtemburg, who preſerved them as precious relics of this great maſter.

Propoſals were publiſhed at Stuttgardt, in 1783, and in Cramer's Mag. der. Mus. for September of the ſame year, for printing by ſubſcription the entire dramatic works of Jomelli in ſcore, which he compoſed during his reſidence at the court of the duke of Wurtemburg, conſiſting of fifteen ſerious operas, five paſtoral dramas, and three burlettas; but whether this undertaking was ever accompliſhed, we have not been able to learn.

The ſerious operas which Jomelli compoſed for Stuttgardt, are the following: "L'Olimpiade, La Clemenza di Tito, Nitteti, Pelope, Enea nel Lazio, Catone in Utica, Il Re Paſtore, Aleſſandro nell' Indie, Ezio, Didone, Demofoonte, Semiramide, Vologeſo, Artaſerſe, and Fetonte." Paſtoral dramas: "Imeneo in Atene, Il Paſtore Illuſtre, and L'Iſola Diſabitata." Comic operas: "Il Matrimonio per Concorſo, La Schiava Liberata, and Il Cacciatore Deluſo."

Very few entire operas of Jomelli were ever performed in England: the firſt was "Attilio Regolo," in 1753, without any captivating ſinger. Serafini, firſt man, with little voice, though a good actor; and the Viſconti, firſt woman, but now *paſſée*, were little able to render the muſic captivating, or even to do it juſtice. Yet an extraordinary circumſtance happened during the whole run of this opera, which no other, perhaps, could ever boaſt. This drama was terminated by a piece of recitative without a ſubſequent air, in ſpeaking which, Serafini was conſtantly encored. A circumſtance the more extraordinary, as the Engliſh in general, who are ignorant of the Italian language, hate recitative, and would never go a ſecond time to an opera, if not attracted by the airs and fine ſinging.

In 1755, Jomelli's opera of "Andromaca" was performed in London; in which the firſt air, "Si ſoffre un cor trianno," has conſiderable merit; but the cloſe of the allegro is now old faſhioned. A great part of this opera was compoſed by Jomelli in his firſt manner; but originality and the hand of a maſter always appear. The air, "Eccoti il figlio," as ſung and acted by Mingotti, was truly dramatic and affecting. The whole is very ſuperior to almoſt all contemporary productions.

In 1759, a duet by Jomelli, in the paſticcio opera of "Vologeſo," was extremely pleaſing, and the firſt which we remarked on the preſent dramatic model, chiefly in dialogue, with only burſts of paſſion, in two parts. And Eliſi, while he was in England, ſung ſeveral grand airs by Jomelli, compoſed on purpoſe to diſplay that ſinger's dexterity in hitting wide intervals.

In 1768, Guarducci, inſtead of an opera for his benefit, had the oratorio of "Betulia Liberata," written by Metaſtaſio, and ſet by Jomelli, in which, among many admirable compoſitions, an air of ſupplication by the high prieſt, through which were heard the murmurs of the people in a diſtant chorus, crying for peace and bread in tones ſo ſubdued as ſcarcely to be heard, was juſtly admired for its fine and new effect.

After he quitted Germany, Jomelli compoſed a great number of operas expreſsly for the king of Portugal, who tried every expedient to tempt him to go to Liſbon; which honour, though he declined, on account of the delicate ſtate of his wife's health, yet he annually furniſhed that prince with new productions, as well as with whatever he compoſed for other purpoſes.

He compoſed, after his return to Naples, three operas for that city: "Armida," in 1769; "Demofoonte," 1770; "Iſigenia in Aulide," 1771. And in 1772, "Achille in Sciro," for Rome, which was his laſt.

Some of the muſic which he compoſed for the dances of his operas has been much celebrated, particularly his "Chaconne," which is well known in England, and has ſerved as a model for that ſpecies of dance throughout Europe, ever ſince it was compoſed.

The operas of Jomelli will be always valuable to profeſſors and curious collectors, for the excellence of the compoſition; though it has been thought neceſſary, in compliance with the general rage for novelty, to lay them aſide and to have the ſame dramas new ſet for the ſtage, in order to diſplay the talents, or hide the defects, of new ſingers.

As Jomelli was a great harmoniſt, and naturally grave and majeſtic in his ſtyle, he ſeems to have manifeſted abilities in writing for the church, ſuperior even to thoſe for the ſtage.

Of the many oratorios he compoſed, we are only acquainted with three: "Iſacco Figura del Redentore;" "Betulia Liberata;" and "La Paſſione;" all written by Metaſtaſio, and all admirably ſet. In the firſt accompanied recitative and air of "Iſacco," at the opening of the ſecond part, beginning, "Chi per pietà mi dice, il mio figlio che fa?" in which are painted, with an uncommon degree of agitation and paſſion, the anxiety and terror of Sarah, during the abſence of Abraham, whom ſhe ſuppoſes is in the act of ſacrificing her ſon Iſaac, have been juſtly much admired.

We are in poſſeſſion of a Te Deum and a Requiem of his compoſition, which manifeſt him to have been a great maſter of the church ſtyle; though he had acquired great fame as a dramatic compoſer before he began to exerciſe himſelf in this ſpecies of writing, concerning which he had never beſtowed a thought ſince he left the muſic-ſchool, or conſervatorio, till about the year 1751, when it having been determined at Rome that the muſic for paſſion-week ſhould be as excellent as poſſible, Durante, Jomelli, and Perez, were employed to ſet the leſſons from the Lamentations of Jeremiah, for the three moſt ſolemn days of that holy time. Jomelli's compoſition was performed on Wedneſday, Perez's on Thurſdays, and Durante's on Good Friday. The firſt is entitled "Lettione Primo per li mercoledì ſanto, con Violini, Oboè, Viola, Flauti e Corni da Caccia." The ſecond "Lettione Prima del Giovedì ſanto, a Soprano ſolo, con Violini, Viola, Oboè, e Corni da Caccia." And the third "Lettione Terza del Venerdì ſanto, a 4 Voci, con Violini, Viola, e Corni da Caccia." Having procured a ſcore of theſe compoſitions at Rome, and lately examined them, we can venture to ſay that they all appear admirable: and as the compoſers were all men of great abilities, who exerted themſelves on this honourable occaſion, it is difficult to determine, in their ſeveral ſtyles, which is the beſt. The productions of Jomelli and Perez are in an elevated, elegant, dignified, ſupplicating, and expreſſive oratorio ſtyle; and that of Durante more in the ancient ſtyle of church muſic: more learned in modulation, more abounding in fugue, and more elaborate in the texture of the parts, as might be expected from his maturer age, and the ſolemnity of the day on which his muſic was to be performed.

But though Jomelli acquired conſiderable fame by this compoſition for the church, yet he was ſo far from being intoxicated by it, that in a viſit to Padre Martini, at Bologna, ſoon after, he told this learned contrapuntiſt that he had a ſcholar to introduce to him. Padre Martini aſſured him, that he ſhould be glad to inſtruct any one ſo well recommended. And a few days after, the good father aſking who and where was the diſciple he had talked of? Jomelli anſwered, *Padre ſon io*; and pulling a *ſtudio* of paper out of his pocket, on which he had been trying his ſtrength in modulation and fugue upon *canto fermo*, begged of him to examine and point out his errors.

From this period he produced many admirable compoſitions for the church, in which he united elegance with learning, and grace with bold deſign. Among other productions of this kind, the two following merit commemoration. An "Offertorio," or motet, for five voices without inſtruments, followed by an Alleluja of four parts in chorus; and a "Miſſa pro defunctis," or burial ſervice, which he compoſed at Stuttgardt for the obſequies of a lady of high rank and favour at the court of his patron, the duke of Wurtemburg. Theſe compoſitions, which are learned without pedantry, and grave without dulneſs, will be laſting monuments of his abilities as a contrapuntiſt.

But the moſt elaborate of all his compoſitions, is the "Miſerere," or fifty-firſt pſalm, tranſlated into Italian verſe, by his friend Saverio Mattei, which he ſet for two voices, accompanied with inſtruments, in 1773, the year before his deceaſe. In this production, which breathes a pious gravity, and compunction of heart ſuited to the contrite ſentiments of the pſalmiſt, there is a manifeſt ſtruggle at extraneous modulation and new effects, perhaps too much at the expence of facility and grace. Though all the movements of this compoſition are ſlow, yet the execution is ſo difficult, both to the voices and inſtruments, that when it was performed in London at Marchetti's benefit, it was the opinion of the late Mr. Bach, that Jomelli had purpoſely written what he could not execute himſelf, in order to perplex the performers. This, however, muſt have been ſaid in pleaſantry, for Jomelli had no malevolence in his diſpoſition; perhaps in ſtriving at excellence with too great ſolicitude, he ſometimes had recourſe to art and ſtudy, inſtead of giving way to his own feelings. There are, however, admirable ſtrokes of paſſion as well as ſcience in the muſic that he has ſet to this pſalm, which, though above the comprehenſion of common hearers, will afford great pleaſure to thoſe that are able to read the ſcore, or to follow the performers through the labyrinths of art.

This admirable compoſer had, in general, ſuch a facility in writing, that he ſeldom courted the Muſe at an inſtrument; and ſo tenacious a memory, that Sacchini aſſured us he frequently compoſed an air on opening a book of lyric poetry, while, like a peripatetic, he has been walking about a room, which he remembered a year after, and then committed it to paper, as faſt as he could write a letter.

As Raphael had three manners of painting, Jomelli had three ſtyles of compoſition. Before he went to Germany, the eaſy and graceful flow of Vinci and Pergoleſi pervaded all his productions; but when he was in the ſervice of the duke of Wurtemburg, finding the Germans were fond of learning and complication, he changed his ſtyle in compliance with the taſte and expectations of his audience; and on his return to Italy, he tried to thin and ſimplify his dramatic Muſe, which, however, was ſtill ſo much too operoſe for Italian ears, that in 1770, upon a Neapolitan being aſked how he liked Jomelli's new opera of "Demofoonte," he cried out with vehemence, *è ſcelerata, Signore!*

Climate ſeems to operate ſo much on muſic, however its influence may be diſputed in manners and government, that what is admired in one country is deteſted in another. In cold climates *labour* is neceſſary to circulation; in hot, *eaſe* is the grand deſideratum. This principle is carried to ſuch exceſs in Italy, that whatever gives the hearer of muſic the leaſt trouble to diſentangle, is Gothic, pedantic, and *ſcelerata*. As to difficulties of *execution*, in a *ſingle part*, the compoſers and performers may ſpin their brains, and burſt their blood-veſſels, and welcome, provided the texture of the parts is clear and ſimple.

The Gothic inventions, as they call them, of fugues, canons, and laboured counterpoint of the ſixteenth century, they are willing to reſign to the Flemings, who firſt brought them into Italy; but of which all the natives, except a few obſtinate pedants, ſtruggled to diveſt their muſic, particularly that for the ſtage, during the laſt two centuries.

It is the *exceſs* only of learning and facility that is truly reprehenſible by good taſte and ſound judgment; and *difficult* and *eaſy* are relative terms, which they only can define. To lovers of muſic who have heard much in various ſtyles, little is new; as to others who have heard but little, all is new. The former want reſearch and new effects, which, to the latter, old muſic can furniſh. Palates accuſtomed to plain food find *ragoûts* and *morceaux friands* too highly ſeaſoned; while to thoſe who have long been pampered with dainties, ſimplicity is inſipid. How then is a compoſer or performer to pleaſe a mixed audience, but by avoiding too much complacence to the excluſive taſte of either the learned, or the ignorant, the ſupercilious, or the ſimple?

The health of Jomelli began to decline in 1770, ſoon after we had ſeen him in perfect health at Naples. He was then corpulent, and reminded us of the figure of Handel. In 1771, he had a ſtroke of the palſy, which, however, did not impair his intellects, as he compoſed "Achille in Sciro" for the Roman theatre, and a cantata for the ſafe delivery of the queen of Naples, in 1772; and in 1773, his Italian "Miſerere," the moſt elaborate and ſtudied of all his works.

His learned friend, Signor Saverio Mattei, the tranſlator of the pſalms into Italian verſe, from whoſe admirable verſion Jomelli had taken the "Miſerere," or fifty-firſt pſalm, drew up a very intereſting account of the works and public funeral of the great muſician, and printed it in his "Saggio di Poeſia Latine et Italiane," publiſhed at Naples immediately after his deceaſe.

The reverence and regard with which we have been long impreſſed for the works and character of this gifted man, have already rendered the article too long to admit of further extenſion, or we ſhould have wiſhed to inſert Signor Mattei's whole account; but having given it elſewhere, we ſhall here only cite the introduction, which does equal honour to the author and his friend.

Naples, September, 1774. "Yeſterday all the muſicians of this city united in celebrating the funeral of the great Jomelli. The church was very finely ornamented; and a great number of wax tapers were placed about the pompous bier. Two orcheſtras of three rows each could ſcarcely contain the vocal and inſtrumental performers who aſſiſted in executing the muſic that was expreſsly compoſed on the occaſion by the worthy Sabitini, who beat the time himſelf, as maeſtro di capella. It was the celebrated Genaro Manna, compoſer of the archiepiſcopal church, who firſt ſuggeſted this plan of a public funeral, in which all theſe muſicians had an opportunity of manifeſting their regard for Jomelli, and of furniſhing an example to poſterity of the gratitude due to great talents, which may likewiſe ſtimulate young artiſts to merit equal honours. At the deſire of Signor Manna, not only every muſician attended the funeral and performed gratis, but contributed likewiſe towards the expences of this ſolemnity.

"Jomelli was my friend; he lived two years in my neighbourhood, and I had frequent opportunities of converſing with him, and of admiring his captivating manners, particularly his modeſty in ſpeaking of rival artiſts, whoſe compoſitions

poſitions he readily praiſed, though their authors were not equally candid in ſpeaking of him.

"Jomelli had acquired conſiderable knowledge in other arts than muſic: his poetry was full of taſte, and there is a fine ode of his writing, in the collection publiſhed at Rome, on the ſubject of the reconciliation between the pope and king of Portugal.

"He was ambitious of diſtinguiſhing himſelf from other compoſers in a way peculiar to himſelf. His invention was always fertile, his ſtyle lyrical and Pindaric; and juſt as Pindar darted from one ſubject to another, Jomelli changed his tones and themes in a way wholly new, and learnedly irregular."

This account is terminated with many excellent reflections on the ſtyle of Jomelli, and the cabals and frivolous taſte of the Neapolitans at the time of his death. All we ſhall add is, that the latter works of Jomelli will be ever regarded with reverence by real judges of compoſition, as there is no mixture of trivial or fantaſtical movements or paſſages in his truly claſſical, and often ſublime works.

JON, in *Natural Hiſtory*, the name of a gem deſcribed by Pliny, and ſaid to be brought from the Eaſt Indies; he deſcribes it as being of a purple or violet colour, but rarely very deep in the tinge. It ſeems to have been a ſpecies of amethyſt.

Jon *of Chios*, in *Biography*, a tragic and lyric poet and philoſopher, who firſt recited his poems in the 82d Olympiad, 452 years B.C., mentions in ſome verſes quoted by Euclid, the ten-ſtringed lyre, Δεκαχορδω λυρα; a proof that the conjoint tetrachord was added to the ſcale in his time, which was about fifty years after Pythagoras is ſuppoſed to have conſtructed the octachord. Jon died, according to Fabricius, vol. i. p. 681, 419 B. C., and 78 years after Pythagoras. Beſides tragedies and dithyrambics, Jon compoſed odes, pæans, hymns, and ſcolia, or convivial ſongs.

IONA, I, Hii, or *I-Colum-kill*, in *Geography*, one of the weſtern iſlands of Scotland, in the Atlantic ocean, is ſeparated from the weſtern point of Mull by a narrow channel, called the ſound of I. It meaſures about three miles in length, by three quarters of a mile in breadth. It is a place of much note in the early annals of the country, as the retreat of learning, during the age of barbariſm and illiteracy which pervaded Europe after the overthrow of the Roman empire. Dr. Johnſon calls this place "the luminary of the Caledonian regions, whence ſavage clans and roving barbarians derived the benefits of knowledge, and the bleſſings of religion." The monkiſh writers called this iſland Iona, which ſignifies the iſland of waves; Bede calls it Hii; but the proper name is I, (founded like the Engliſh *ee*,) which in the Gaelic ſignifies iſland, this being called ſo by way of eminence. In more modern times, this inſular diſtrict obtained the name of I-Colum-kill, that is, the iſland of Columb's-cell. The name Iona is now diſuſed, and the iſland is generally called I, except when the ſpeaker would wiſh to mark it with peculiar emphaſis, and then it is expreſſed I-Colum-kill. The Druids were undoubtedly in poſſeſſion of this iſland prior to the introduction of Chriſtianity: a green eminence, cloſe to the ſound of I, is to this day called the Druid's burial place; and here are ſtill extant the remains of a ſmall Druidical temple, or circular row of upright ſtones, in a farm called Roſſal, where, as the name imports, the courts of juſtice were held. The iſland ſeems to have been early the ſeat of a religious ſociety of Chriſtians, or order of monks, named Culdees, who ſettled here about the beginning of the ſixth century. The foundation of a circular building or houſe, called the Culdees cell, ſtill remains. The hiſtory of the Druids in this iſland is wholly unknown; but that of the Culdees has been amply and learnedly narrated by Dr. Jamieſon, in a quarto volume, publiſhed in 1811. It was reſerved for Columba to raiſe the fame of the iſland to the great height it attained to in his own and after ages. This eminent man left his native country, Ireland, in the year 563, to preach the goſpel to the Northern Picts; and having converted the Pictiſh monarch, obtained from him the grant of this ſequeſtered iſle, where he founded an abbey for canons regular. Having ſucceſsfully preſided here upwards of thirty years, he died June 9th, 597; leaving his abbey firmly ſettled, a people converted by his labours from Paganiſm to Chriſtianity, and a name renowned for ſanctity, piety, and "good works." The abbey acquired very extenſive juriſdictions; held, for many ages, the chief ſway among the Scottiſh and Pictiſh monaſteries; and was liberally endowed by the piety and munificence of the kings and great men of Scotland. The Danes diſlodged the monks in 807, and the abbey remained for ſeveral years depopulated; but on the retreat of the invaders, it received a new order of inhabitants, the Cluniacs, who continued to occupy it till the diſſolution of monaſtic inſtitutions, when the revenues were united to the ſee of Argyle; and, on the abolition of epiſcopacy, became the property of the duke of Argyle. The remains of the abbey, and its appendages, though much dilapidated, are, by the care and attention of the Argyle family, kept in better preſervation than moſt ruins of the kind in Scotland. The late dukes built a wall round the whole abbey, to prevent further depredations; and prohibited their tenants from removing any fallen ſtones. Time has levelled ſome of the buildings with the ground; but the greater part is ſtill ſtanding. The cathedral, or St. Mary's church, is almoſt entire: it is built in the form of a croſs, 115 feet in length, and 23 in width; the length of the tranſept 70 feet. In the church-yard is a croſs of a ſingle piece of red granite, 14 feet high, 22 broad, and 10 inches thick. St. Oran's chapel, ſaid to be the firſt building begun by Columba, is ſtill ſtanding, but in a ruinous condition. The Virgin's chapel was entire till within a few years, when part of it fell. Moſt of the cloiſters and the biſhop's houſe are alſo ſtanding. There is ſtill remaining of the abbey, ſufficient to give a tolerable idea of what it was. Of the nunnery, an eſtabliſhment nearly coëval with the abbey, there are fewer remains: the church belonging to it is deprived of the roof. Here alſo ſtands what was called the pariſh church, yet entire, but verging to decay. Near the chapel of St. Oran is a large encloſure, called the "burying-place of Oran," in which are depoſited the remains of forty-eight Scottiſh kings, four kings of Ireland, eight Norwegian monarchs, and one king of France, who were ambitious of repoſing in this hallowed ground. In the ſame ſanctuary, at a reſpectful diſtance, lie moſt of the lords of the iſles.

The iſland of I is included in the united pariſhes of Kilfinchen and Kilviceuen. It abounds with many valuable minerals. Here is but one ſmall village, containing about 60 houſes and 350 inhabitants. The pariſh miniſter of Kilviceuen viſits this iſland every quarter of a year, which is the only opportunity of public worſhip and religious inſtruction which the people now enjoy. Strange reverſe! that divine ſervice ſhould be performed but four times in the year, in a place where it was formerly celebrated as many times in a day. Sinclair's Statiſtical Account of Scotland, vol. xiv. Pennant's Tour in Scotland. Johnſon's Journey to the Weſtern Iſlands. Chalmers's Caledonia. Jamieſon's Hiſtorical Account of the ancient Culdees, &c. 4to. 1811.

Iona, a town of Hindooſtan, in the country of Delhi; 25 miles S. of Delhi.

JONÆ Piscis, the *Jonas-fiſh*, a name given by many authors to the common ſhark, the *canis carcharias* of authors.

It has this name from an opinion that it was the fiſh which ſwallowed up the prophet of that name. But there are many objections to ſuch an opinion.

JONAH, or *the Prophecy of Jonah*, who was the ſon of Amittai, and a native of Gathhepher, a town belonging to the tribe of Zebulon, in Lower Galilee, a canonical book of the Old Teſtament, in which it is related, that Jonah was ordered to go and propheſy the deſtruction of the Ninevites; but that diſobediently attempting a voyage another way, he was diſcovered by the riſing of a ſudden tempeſt, and caſt into the ſea, where he was ſwallowed up by a large fiſh. Having lodged three days and three nights in the belly of the fiſh, he was diſgorged upon the ſhore: whereupon, being ſenſible of his paſt danger, and ſurpriſing deliverance, he betook himſelf to the journey and embaſſy to which he was appointed. Arriving at Nineveh, the metropolis of Aſſyria, he, according to his commiſſion, boldly laid open to the inhabitants their ſins and miſcarriages, and proclaimed their ſudden overthrow; upon which the whole city, by prayer and faſting, and a ſpeedy repentance, happily averted the divine vengeance, and eſcaped the threatened ruin. Jonah, inſtead of admiring the divine clemency, was indignant under the apprehenſion that his veracity would be ſuſpected, and that he would be deemed by the people to be a falſe prophet. Having retired from the city, he prepared for himſelf a booth, over which a plant ſprang up miraculouſly in one night, which, by its ſpreading foliage, ſheltered him from the burning heat of the ſun. But the plant ſuddenly withering away, ſo that he was expoſed to a ſuffocating wind and the ſun's ſcorching beams, he again expreſſed his impatience, and his wiſh to die rather than to live in ſuch circumſtances of diſtreſs. At length, having been reproved for his impatient, querulous temper, and the conduct of Providence in ſparing the Ninevites having been juſtified to his full conviction, his complaints were ſilenced. Of his further hiſtory we have no authentic account. Jonah was the moſt ancient of all the prophets whoſe writings are preſerved in the Scripture canon. Some have ſuppoſed that he propheſied in the latter end of Jehu's, or the beginning of Jehoahaz's reign, at which time the kingdom of Iſrael was brought very low by the oppreſſions of Hazael king of Syria. (2 Kings, xiii. 22.) Others refer his predictions to the reign of Jeroboam II. king of Iſrael, or between the years 823 and 783 B.C. 2 Kings, xiv. 25. Newcome's Verſion and Notes.

JONDAL, in *Geography*, a town of Norway, in the the dioceſe of Bergen; 30 miles E. of Bergen.

JONDISABUR, a town of Perſia, in the province of Chuſiſtan; 185 miles E.S.E. of Bagdad.

JONEIKISCHKEN, a town of Pruſſian Lithuania; 36 miles W. of Tilſit.

JONES, in *Biography*, a Welſhman who was blind, and the beſt performer on the harp of his time. The old ducheſs of Marlborough would have retained him in her ſervice, with a penſion, as an inmate; but he could not endure confinement, and was engaged by Evans, the landlord of a well-accuſtomed home-brewed ale-houſe, at the Hercules' Pillars, oppoſite Clifford's Inn paſſage in Fleet-ſtreet, where he performed in a great room up ſtairs during the winter ſeaſon. He played extempore voluntaries, the fugues in the ſonatas and concertos of Corelli, and moſt of his ſolos, with many of Handel's opera ſongs, with uncommon neatneſs, which were thought great feats, at a time when ſcarcely any thing but Welſh tunes with variations was ever attempted on that inſtrument in the hands of other harpers. He alſo played on the violin, and accurately imitated on that inſtrument, to the great delight of the home-brewed ale-drinkers, the ſobs, ſighs, and groans of a Quaker's ſermon.

Evans dying, his widow took Cuper's Gardens in Surrey, oppoſite to Somerſet-houſe; erected an orcheſtra there, which was reckoned the beſt for muſic in the kingdom; furniſhed it with an organ, which was played by little Harry Burgeſs, the harpſichord-player at Drury-lane, with his uſual unmeaning neatneſs; and eſtabliſhed the Gardens as an evening place of entertainment for the ſummer ſeaſon, like Vauxhall, with the addition of fire-works. But it was too much in the vicinity of Drury-lane and Covent-garden for order and decorum to be long preſerved inviolate; ſo that after four or five ſummers, it was ſuppreſſed by the magiſtrates; and poor Jones, who had been admitted as a performer in the orcheſtra by mother Evans, (as ſhe was uſually called,) loſing both his ſalary and importance, died about the year 1748. He was buried in Lambeth church-yard, and his funeral proceſſion, attended by a great number of muſical people, was ſolemnized by the performance of a dead march by a voluntary band of innumerable inſtruments.

Jones, John, late organiſt of St. Paul's, the Charter-houſe, and joint organiſt of the Temple with Stanley. The father of this muſician, a worthy man of profeſſional merit and good conduct, having lived many years at lady Vanbrugh's, Whitehall, as a domeſtic muſician, prevailed on her ladyſhip to patronize his ſon; which ſhe did ſo effectually, that though his abilities as a performer or compoſer were not above mediocrity, nor were his perſon or manners very captivating, yet, by the zeal and influence of his father's patroneſs, he obtained three places, which are regarded by muſicians as the poſts of honour in London, and more deſirable, if the king's chapel be excepted, than any at which an organiſt can aſpire.

Jones, John, a phyſician of the 16th century, and author of ſeveral works, but of whoſe hiſtory little more is known than that he was born in Wales, or was of Welſh extraction; that he ſtudied at both our univerſities, and took a medical degree at Cambridge; and that he became eminent in the practice of his profeſſion at Bath, and in Nottinghamſhire and Derbyſhire. He mentions curing a perſon at Louth in 1562; and the date of his laſt publication is 1579. He wrote only in the Engliſh language, and left the following works: 1. "The Dial of Agues," Lond. 1556; 2. "The Benefit of the ancient Bathes of Buckſtone, which cureth moſt grievous Sickneſſes," ibid. 1572. This work contains very little concerning either the nature or hiſtory of theſe baths; but chiefly general directions, compiled from ancient authors, relative to the diet and regimen proper to be uſed with a courſe of bathing; 3. "The Bathes of Bath's ayde, wonderful and moſt excellent againſt very many Sickneſſes," ibid. 1572.; 4. "A brief, excellent, and profitable Diſcourſe of the natural Beginning of all growing and living Things, Heat, Generation, &c." Lond. 1574; 5. "A Tranſlation, from Latin into Engliſh, of Galen's four Books of Elements," ib. 1574. Dr. Aikin puts the following *quære*, after mentioning this work: "Is not this the ſame with the preceding piece?" 6. "The Art and Science of preſerving Body and Soul in Health, Wiſdom, and Catholic Religion," 1579, 4to. See Aikin, Biog. Mem. of Med.

Another phyſician, of the name of John Jones, is mentioned by bibliographers, who was born at Landaff, and was admitted a member of the Royal College of Phyſicians, in London, near the end of the 17th century, and was author of the following publications: 1. “Novarum Diſſertationum de morbis abſtruſioribus Tractatus primus, de Febribus intermittentibus. In quo obiter de Febris continuæ natura explicatur,” Lond. 1683; 2. “De morbis Hibernorum et de Dyſenteria Hibernicâ,” ib. 1698.; “The Myſteries of Opium revealed,” ib. 1701. Eloy. Dict. Hiſt.

Jones, Inigo, an eminent architect, was born in London about the year 1572. He was probably intended for a mechanical employment, but his talent for the fine arts attracted the notice of ſome conſiderable perſons about the court, among whom were the earls of Arundel and Pembroke. To the latter of theſe noblemen he was indebted for that degree of patronage which enabled him to viſit Italy for the purpoſe of perfecting himſelf in landſcape-painting, to which his genius ſeemed firſt to point. He took up his reſidence chiefly at Venice, where it is ſaid the works of Palladio gave him a turn to the ſtudy of architecture, which branch of art he made his profeſſion. He was invited by Chriſtian IV. king of Denmark, to undertake the office of his firſt architect. Having been ſome years in the ſervice of that ſovereign, he accompanied him, in 1606, on a viſit to his brother-in-law, king James; and, expreſſing a deſire of remaining in his native country, he was appointed architect to the queen. He ſerved prince Henry in the ſame capacity, and obtained a grant, in reverſion, of the place of ſurveyor-general of the works. After the death of the prince, Mr. Jones viſited Italy again, and ſpent ſome years there in improving himſelf in his art. On his return he undertook the duties of the office of ſurveyor-general, and finding the Board of Works much in debt, he relinquiſhed his own dues, and prevailed upon the other principal officers to do the ſame, till all arrears were cleared. In 1620 the king ſent him to inveſtigate the nature and purpoſe of that remarkable antiquity, Stonehenge; and he wrote a treatiſe to prove that it was the work of the Romans, but he made no converts to this opinion. He was now employed in building the banquetting-houſe at Whitehall, which remains a model of the pure and elegant taſte of the architect. He was likewiſe appointed a commiſſioner for repairing the cathedral of St. Paul's, which office, as well as his other poſts, was continued to him under the reign of Charles I. The repairs of St. Paul's did not commence till 1633; and he is accuſed of having committed, in that undertaking, ſome capital faults by mixing the Roman and Grecian ſtyle with the Gothic. He had much employment both from the court and nobility, and realized a handſome fortune, which was diminiſhed by his ſufferings during the troubles which ſucceeded. He was obnoxious as a favourite of his royal maſter, and as a Roman Catholic. He was firſt attacked in 1640, when he was called before the houſe of lords, on a complaint of the pariſhioners of St. Gregory's, for demoliſhing part of their church, in order to make room for his additions to St. Paul's. He was fined, in 1646, 545*l.* as a malignant. He was much afflicted by the king's death, and died, worn down by grief and misfortune, in July 1651. He was the greateſt Engliſh architect previouſly to ſir Chriſtopher Wren. A collection of his deſigns was engraved and publiſhed by Mr. Kent, in two volumes folio, 1727. Others were publiſhed in 1743 and 1744. A copy of Palladio's architecture, with manuſcript notes by Mr. Jones, is in the library of Worceſter college, Oxford. Biog. Brit.

Jones, William, father of ſir William, the ſubject of the next article, was born in the year 1680, in the iſland of Angleſey, North Wales. His parents were yeomen, or little farmers, in that iſland, and gave to their ſon the beſt education which their circumſtances would allow; but he owed his future fame and fortune to the diligent cultivation of the intellectual powers by which he was eminently diſtinguiſhed. Addicted from early life to the ſtudy of mathematics, he commenced his career of advancement in the humble office of a teacher of theſe ſciences on board a man of war. In this ſituation he attracted the notice, and obtained the friendſhip of lord Anſon. He appeared as an author in his 22d year; when his treatiſe on the art of navigation was much approved. We may judge of his predominant taſte for literature and ſcience by a trivial circumſtance which occurred at the capture of Vigo, in 1702. Having joined his comrades in pillaging the town, he ſelected a bookſeller's ſhop, in hope of obtaining ſome valuable plunder; but, diſappointed in his expectations, he took up a pair of ſciſſors, which was his only booty, and which he afterwards exhibited to his friends as a trophy of his military ſucceſs. On his return to England, he eſtabliſhed himſelf as a teacher of mathematics in London; and here, at the age of 26 years, he publiſhed his “Synopſis Palmariorum Matheſeos;” a work which has ever ſince been held in the higheſt eſtimation as a compendious but comprehenſive ſummary of mathematical ſcience. Mr. Jones was no leſs eſteemed and reſpected on account of his private character and pleaſing manners, than for his natural talents and ſcientific attainments; ſo that he reckoned among his friends the moſt eminent perſons of the period in which he lived. Lord Hardwicke ſelected him as a companion on the circuit, when he was chief juſtice; and when he afterwards held the great ſeal, conferred upon him the office of ſecretary for the peace, as a teſtimony of his friendſhip and regard. He was alſo in habits of intimate acquaintance with lord Parker, preſident of the Royal Society, ſir Iſaac Newton, Halley, Mead, and Samuel Johnſon. So highly was his merit appretiated by ſir Iſaac Newton, that he prepared, with his permiſſion, and very much to his ſatisfaction, a very elegant edition of ſmall tracts in the higher mathematics. Upon the retirement of lord Macclesfield to Sherborne caſtle, Mr. Jones reſided in his family, and inſtructed his lordſhip in the ſciences. Whilſt he occupied this ſituation he had the misfortune, by the failure of a banker, to loſe the greateſt part of that property which he had accumulated by the moſt laudable induſtry and economy; but the loſs was in a great meaſure repaired to him by the kind attention of his lordſhip, who procured for him a ſinecure place of conſiderable emolument. He was afterwards offered, by the ſame nobleman, a more lucrative ſituation; which, however, he declined, that he might be more at leiſure to devote himſelf to his favourite ſcientific purſuits. In this retreat he formed an acquaintance with Miſs Mary Nix, the daughter of a cabinet-maker, who had become eminent in his profeſſion, and whoſe talents and manners had recommended him to an intimacy with lord Macclesfield. This acquaintance terminated in marriage; and the connection proved a ſource of perſonal ſatisfaction to Mr. Jones himſelf, and of permanent honour to his name and family. By this lady Mr. Jones had three children; two ſons and a daughter. One ſon died in infancy; the other will be the ſubject of the next article; and the daughter, who was married to Mr. Rainsford, an opulent merchant retired from buſineſs, periſhed miſerably, in the year 1802, in conſequence of her clothes accidentally taking fire. The death of Mr. Jones was occaſioned by a polypus in the heart, which, notwithſtanding the medical attention and aſſiſtance of Dr. Mead, proved incurable. Of the ſingular ſelf-poſſeſſion and promptitude of Mrs. Jones, the following anecdote is related. A friend, who knew her huſband's dangerous ſituation, addreſſed him with a letter of condolence, recommending acquieſcence and reſignation from a due conſideration of the brevity of life. Mrs. Jones, perceiving its purport, and probably dreading its effects on the ſpirits of her huſband, when ſhe was deſired by him to read it, compoſed in the moment another letter ſo clearly and ſo rapidly, that he had no ſuſpicion of the deception; and this ſhe executed in a ſtyle ſo chearful and entertaining, that, inſtead of being depreſſed, he was greatly exhilarated by it. His diſorder at length terminated in his death, which happened ſoon after the incident we have related, in July 1749. The property of which he died poſſeſſed was moderate; but his reputation was univerſally acknowledged. After his death, the widow was favoured with many offers of ſervice by thoſe who reſpected her deceaſed huſband; and ſhe was under peculiar obligations to Mr. Baker, author of a treatiſe on the microſcope, &c. for aſſiſtance in arranging the collection of ſhells, foſſils, and other curioſities left by Mr. Jones, and diſpoſing of them to the greateſt advantage. His library was bequeathed to lord Macclesfield. It has been ſaid by the compilers of the Biographical Dictionary, that Mr. Jones had completed a very important mathematical work, and had actually ſent the firſt ſheet to the preſs, but that the progreſs of his diſorder obliged him to diſcontinue the impreſſion. It is moreover ſaid, that the MS. fairly tranſcribed, was entruſted, a few days before his demiſe, to the care of lord Macclesfield, who promiſed to publiſh it for the honour of the author, and the benefit of his family. If this account be true, and a work, which was to have been entitled, "The Introduction to the Mathematics," had been actually prepared, the MS. muſt have been loſt, as it could not be found among the books and papers of lord Macclesfield, who ſurvived his friend many years. Among the memoranda of ſir William Jones there is no document that ſerves to confirm or diſprove this account. The mathematical works of Mr. Jones, that have been publiſhed, are much admired for neatneſs, brevity, and accuracy; and they afford ample evidence, teſtified alſo by his correſpondence with Mr. Cotes of Cambridge, that he was a very eminent mathematician. We have already mentioned his "New Compendium of the whole Art of Navigation," 8vo. 1702; and his "Synopſis Palmariorum Matheſeos; or, a new Introduction to the Mathematics, containing the Principles of Arithmetic and Geometry, demonſtrated in a ſhort and eaſy Method," 8vo. 1706. In the Philoſophical Tranſactions, we have ſeveral papers on logarithms, on the properties of conic ſections, on the diſpoſition of equations for exhibiting the relations of geometrical lines, &c. communicated to the Royal Society, of which he was a member. He was alſo the editor of ſome mathematical works of ſir Iſaac Newton, under the title of "Analyſis per quantitatum ſeries, fluxiones, ac differentias; cum enumeratione linearum tertii ordinis." Memoirs of the Life, Writings, and Correſpondence of ſir William Jones, by lord Teignmouth.

Jones, *Sir* William, the ſon of the ſubject of the preceding article, was deſcended, by the maternal ſide, from ſome of the ancient princes and chieftains of North Wales; but he is entitled to notice in this place on account of much more important and valuable diſtinctions; thoſe of talents, acquirements, and character, which raiſed him to a rank of pre-eminence, that has been attained by few either in ancient or modern times. From the materials ſupplied by lord Teignmouth, in his ample and excellent "Memoirs of the Life, Writings, and Correſpondence of ſir William Jones," in addition to thoſe which our own recollection will furniſh, we ſhall be able to give an account of this diſtinguiſhed perſon, which, however imperfect it may be, and however inadequate to our ſentiments of perſonal reſpect, and feelings of lively gratitude, cannot fail of being intereſting to our readers; nor will they need any apology if we exceed our uſual limits on this occaſion.

Sir William Jones was born in London on the eve of the feſtival of St. Michael, in the year 1746; but having loſt his father when he was three years old, the care of his education devolved upon his mother, who appears to have been eminently qualified to direct and ſuperintend it, more particularly in his infant years. Her character has been delineated by her huſband in the following terms: "She was virtuous without blemiſh, generous without extravagance, frugal but not niggard, cheerful but not giddy, cloſe but not ſullen, ingenious but not conceited, of ſpirit but not paſſionate, of her company cautious, in her friendſhip truſty, to her parents dutiful, and to her huſband ever faithful, loving and obedient." Mrs. Jones took great pains, by the ſtudy of algebra, trigonometry, and navigation, to qualify herſelf for being the preceptreſs of her ſiſter's ſon; and to theſe ſciences, rather remote from a lady's province, ſhe paid particular attention, becauſe he was deſtined to a maritime profeſſion. Her ſolicitude for the improvement of her own ſon induced her to decline accepting the kind invitation of the counteſs of Macclesfield to remain at Sherborne caſtle, after her huſband's death; and her diſcriminating judgment led her, in her plan for his inſtruction, to reject the ſeverity of diſcipline, and to conduct his mind inſenſibly to knowledge and exertion, by exciting his curioſity and directing it to uſeful objects. In conſequence of her attention, he was, in his fourth year, able to read diſtinctly and rapidly any Engliſh book; and with a view to the cultivation of his memory, ſhe cauſed him to learn and repeat ſome of the moſt popular ſpeeches in Shakſpeare, and the beſt of Gay's fables. His propenſity to reading was ſignally manifeſted in his fifth year; and in his ſixth he was initiated by the aſſiſtance of a friend in the rudiments of the Latin grammar. At Michaelmas 1753, in the cloſe of his ſeventh year, he was placed at Harrow ſchool, of which Dr. Thackeray was the head maſter. During the two firſt years of his reſidence in this ſeminary, he was diſtinguiſhed more by diligence than by ſuperiority of talents; but his faculties gained ſtrength by exerciſe, and the proſpect of the eminence to which he afterwards attained gradually brightened. His mother, who anxiouſly watched over his progreſs, improved the opportunities which his vacations, and the abſence of 12 months from ſchool, in conſequence of the fracture of his thigh-bone, afforded, of increaſing his acquaintance with his native tongue, and with Engliſh authors, and of teaching him alſo the rudiments of drawing, in which ſhe herſelf excelled. During this interval, the progreſs of his claſſical ſtudies was interrupted. However, on his return to ſchool, he was placed in the claſs to which he would have attained, if no interruption had occurred. This error of judgment, on the part of his maſter, though it ſubjected him to corporal puniſhment and degradation for non-performance of exerciſes which ſhould not have been required, and though it produced in his mind an invincible abhorrence of his maſter's conduct, ſerved to rouſe his emulation, and to call forth the exertion of his native powers; ſo that in a little while he was advanced to the head of his claſs, and might, if he had been ſo diſpoſed, have retorted on his claſs-fellows their former reproaches of his indolence or dulneſs. In his 12th year, he was removed to the upper ſchool. At this time a circumſtance occurred, which afforded ſignal evidence of the ſtrength and tenaciouſneſs of his memory. His ſchool-fellows propoſed to amuſe themſelves with the repreſentation of a play; and at his recommendation the Tempeſt was ſelected; but not being able to procure a copy, he furniſhed them with it from his memory; and in the exhibition he performed the part of Proſpero. As he advanced in the ſchool, his diligence increaſed; and he commenced the ſtudy of the Greek language. At this time he tranſlated into Engliſh verſe ſeveral of the epiſtles of Ovid, and all the paſtorals of Virgil; and he compoſed a dramatic piece on the ſtory of Meleager, which he denominated a tragedy, and which, during the vacation, was acted by ſome of his moſt intimate ſchool-fellows; the part of the hero being performed by himſelf. His acquaintance with proſody was very diſtinguiſhed; ſo that he was able to ſcan the trochaic and iambic verſes of Terence, before his companions ſuſpected that they were any thing but mere proſe. At ſchool he wrote the exerciſes of many boys in the two ſuperior claſſes, and thoſe in his own claſs were happy to become his pupils. During the holidays he learned the rudiments of French and arithmetic; and in this early age he was highly gratified by being honoured with an admiſſion to the ſociety of learned and ingenious men at the houſe of Mr. Baker and his friend Mr. Pond. At the requeſt of his mother he read the "Spectacle de la Nature;" but derived greater amuſement, as he acknowledged, from the Arabian tales, and from Shakſpeare, whoſe poems and plays he repeatedly peruſed with increaſed delight. At Harrow he invented a political play, in which Dr. Bennet, biſhop of Cloyne, and the celebrated Dr. Parr, were his principal aſſociates. "They divided the fields in the neighbourhood of Harrow, according to a map of Greece, into ſtates and kingdoms; each fixed upon one as his dominion, and aſſumed an ancient name. Some of their ſchool-fellows conſented to be ſtyled barbarians, who were to invade their territories and attack their hillocks, which were denominated fortreſſes. The chiefs vigorouſly defended their reſpective domains againſt the incurſions of the enemy; and in theſe imitative wars the young ſtateſmen held councils, made vehement harangues, and compoſed memorials, all doubtleſs very boyiſh, but calculated to fill their minds with ideas of legiſlation and civil government. In theſe unuſual amuſements Jones was ever the leader." In his 15th year Dr. Thackeray was ſucceeded by Dr. Sumner, who ſoon diſcovered the talents and acquirements of his pupil; and who afforded him every advantage in the proſecution of his ſtudies which he had it in his power to grant him. Indeed this excellent inſtructor of youth, with an excuſable partiality and an amiable modeſty, was heard to declare, "that Jones knew more Greek than himſelf, and was a greater proficient in the idiom of that language." During the two years which he ſpent with Dr. Sumner, he employed his time in reading and imitating the beſt ancient authors of Greece and Rome; and, devoting the night as well as the day to ſtudy, he acquired the knowledge of the Arabic characters, and a ſufficient acquaintance with the Hebrew language to enable him to read ſome of the Pſalms in the original. His reputation was at this early period of his life ſo extenſive, "that he was often flattered by the inquiries of ſtrangers, under the title of the great ſcholar." Some of his juvenile compoſitions, both in proſe and verſe, may be found in the fragment of a work which he began at ſchool, and entitled "Limon," in imitation of Cicero, and may be found in the complete edition of his works. His inceſſant application occaſioned a weakneſs in his ſight, which rendered it neceſſary for Dr. Sumner to interdict it during the laſt months of his reſidence at Harrow. The intervals of interrupted ſtudy, which he reluctantly allowed himſelf, were employed in learning cheſs, by practiſing the games of Philidor. As he was intended for the profeſſion of the law, for which, however, he does not ſeem to have had any great predilection, ſome of his friends recommended his being placed, at the age of 16, in the office of a ſpecial pleader; others, however, wiſhed him to be removed from Harrow to one of the univerſities. The choice of an univerſity was for ſome time the ſubject of deliberation; but at length Oxford was preferred in conſequence of the recommendation of Dr. Glaſſe, and the inclination of his mother, who determined to reſide with him at the univerſity. In the ſpring of 1764 he was matriculated and admitted into Univerſity college; and in the following term, after having ſpent a few months at Harrow, in order to finiſh a courſe of lectures in which he was much intereſted, he fixed himſelf at Oxford. Upon his firſt ſettlement in the univerſity he was rather diſguſted than pleaſed with the plan of education. "Inſtead of pure principles on the ſubjects of taſte, on rhetoric, poetry, and practical morals, he *complained* that he was required to attend dull comments on artificial ethics, and logic detailed in ſuch barbarous Latin, that he profeſſed to know as little of it as he then knew of Arabic." The only logic then in faſhion was that of the ſchools: and in a memorandum written by himſelf, which," ſays his biographer, lord Teignmouth, "is my authority for theſe remarks, I find an anecdote related of one of the fellows, who was reading Locke with his own pupils, that he carefully paſſed over every paſſage in which that great metaphyſician derides the old ſyſtem." After a reſidence of a few months at the univerſity, on the 31ſt of October, 1764, Mr. Jones was unanimouſly elected one of the four ſcholars on the foundation of ſir Simon Bennett, for which aſſiſtance he was grateful; more eſpecially as the proſpect of a fellowſhip was remote. Addicted to oriental literature for ſeveral years, he now indulged his inclination by the ſtudy of Arabic under the example and encouragement of a fellow ſtudent, and with the aſſiſtance of a native of Aleppo. His ſituation at the univerſity became gradually more pleaſant to him than it was at firſt; for his college tutors, perceiving that his whole time was devoted to improvement, diſpenſed with his attendance on their lectures, and even allowed him to purſue his ſtudies in a manner agreeable to his taſte and inclination. To the peruſal of the principal Greek poets and hiſtorians, and of the entire works of Plato and Lucian, he added the ſtudy of the Arabic and alſo of the modern Perſic languages. During his vacations, which he ſpent in London, he attended the ſchools of Angelo, in order to acquire the elegant accompliſhments of riding and fencing; and at home he directed his attention to the modern languages; reading the beſt authors in Italian, Spaniſh, and Portugueſe. The poſſeſſion of a fellowſhip, which he was anxious of obtaining, partly for relieving his mother from the burden of his education, and partly for ſecuring ſome kind of independence, however inconſiderable, to himſelf, was ſtill at a diſtance; and he almoſt deſpaired of obtaining it. Having been recommended to the family of earl Spencer by Dr. Shipley, to whom he was not perſonally known, but who was not unacquainted with his compoſitions at Harrow, an offer was made to him by Mr. Arden, related, by marriage, to his friend Sumner, of being private tutor to lord Althorp, now earl Spencer. The propoſal was cheerfully accepted, and upon an interview with his pupil, then ſeven years old, he was ſo pleaſed, that he determined to give up all thoughts of a profeſſion, and to devote himſelf to the faithful diſcharge of the duties of education now devolved upon him. In the ſummer of 1765, he wholly left the univerſity, and entered on his new office. At Wimbledon, where he reſided till the approach of winter, he found leiſure to compoſe many of his Engliſh poems, and to read the greateſt part of the Old Teſtament in Hebrew, particularly the book of Job, and the Prophets, which he ſtudied with great attention. In the following ſummer a fellowſhip became vacant, and he was elected to it Aug. 7, 1766. At this time he was offered by the duke of Grafton, then at the head of the treaſury, the place of interpreter for Eaſtern languages, which he politely declined, apprehending that it would be inconſiſtent with his other engagements and purſuits. In the courſe of this ſummer he formed an acquaintance with a young lady, Anna Maria, the eldeſt daughter of Dr. Shipley, then dean of Wincheſter, who was viſiting at Wimbledon, to which he owed the happineſs of his future life. But ſuch were his views of an honourable independence, and his reſolution never to owe his fortune to a wife, or her kindred, that, notwithſtanding the impreſſions made upon his heart by the perſon and converſation of this lady, he could not then admit any idea of a matrimonial connection. In the following winter he attended the two ſchools of Angelo, and by a ſecret arrangement with Gallini, acquired the accompliſhment of dancing. Having occaſion to accompany lord Spencer's family to Spa in the ſummer of 1767, he improved himſelf, during the ſhort period of three weeks' reſidence in this place, in the art of dancing, by the leſſons of Janſon of Aix-la-Chapelle, and acquired a very conſiderable knowledge of the German language. In the year 1768 application was made to Mr. Jones by the ſecretary of ſtate, on behalf of the king of Denmark, then in England, requeſting him to give a literal tranſlation of the life of Nadir Shah in the French language. Having for ſome time declined the propoſal, he at length accepted it; and the tranſlation was publiſhed, after ſome delay, in the year 1770. To the hiſtory of Nadir Shah, he added a treatiſe on Oriental Poetry, which treatiſe, executed by a young man in his 23d year, has been juſtly conſidered as an extraordinary performance; "inſtructive and elegant, intereſting from its novelty, entertaining from its ſubject and variety, and exhibiting the combined powers of taſte and erudition." Being at Tunbridge in 1768, he then began to learn muſic, and afterwards received leſſons from Evans on the Welſh harp. We may here mention his attendance on a courſe of anatomical lectures by the celebrated Hunter, and his ſtudy of the mathematics, which he ſo well underſtood, as to be able to read and underſtand Newton's Principia.

In the beginning of this year he had commenced an acquaintance with Reviczki, afterwards the imperial miniſter at Warſaw, and ambaſſador at the court of England, with the title of count. This accompliſhed nobleman being captivated by the charms of oriental literature, cultivated an intimacy with Mr. Jones, which was continued by a correſpondence, that was carried on for many years. Many of the letters that paſſed between them on their favourite ſubject are publiſhed in the life by lord Teignmouth. In the ſummer of 1769, Mr. Jones attended his pupil to Harrow; and it was with peculiar ſatisfaction that he renewed that intercourſe with Dr. Sumner, which had been for ſome time interrupted, though not altogether diſcontinued. Here he tranſcribed a Perſian grammar, which three years before he had compoſed for a ſchool-fellow, who was deſtined for India; he alſo began a dictionary of the Perſian language.

Of the religious principles of Mr. Jones ſome account may be reaſonably expected. Whilſt he was at Harrow, in his 24th year, we have reaſon to believe that his faith in Chriſtianity was not unblended with doubts. Indeed no particular attention ſeems to have been paid to this part of his education; a circumſtance which, we confeſs, appears to us ſurpriſing, and for which we are unable to account. His mind, however, was ſo upright and ſo well diſpoſed, that he expreſſed his doubts, not in the too faſhionable mode of conceited cavilling, but with a ſincere deſire of obtaining a ſolution of them. Finding himſelf diſappointed, he determined to examine the ſubject for himſelf, and to peruſe the whole ſcripture in the original, that he might be enabled to form a correct judgment of the connection between the two parts, and of their evidence both internal and external. The reſult was a firm belief in the authenticity and inſpiration of the ſacred writings. About this time he drew up a ſeries of propoſitions, which have been found in his own hand-writing in a Hebrew copy of the book of Hoſea, and which contain the ſketch of a demonſtration of the divine authority of the Chriſtian religion. To theſe propoſitions, tranſcribed by his biographer, the following note is ſubjoined: "what muſt be the importance of a book," of which it may be truly ſaid, "if this book be not true, the religion which we profeſs is falſe?"

Towards the end of the year 1769, Mr. Jones accompanied lord Spencer's family to the continent. Soon after his return he adopted the reſolution of altering his plan of life. The courſe which he was purſuing, however agreeable it was rendered to him by the family with which he was connected, did not exactly correſpond to that idea and ſpirit of independence which marked his character. "He united the laudable deſire of acquiring public diſtinction and of making his fortune by his own efforts: above all, he was animated with the noble ambition of being uſeful to his country;" accordingly he determined to devote himſelf to the ſtudy and practice of the law; and with this view he was admitted into the Temple on the 19th of September 1770. His attachment to Oriental literature and to general ſcience, however, continued unabated, notwithſtanding the time and attention which he devoted to his new profeſſion. In 1772 he publiſhed a ſmall volume of poems, conſiſting chiefly of tranſlations from the Aſiatic languages, with two proſe diſſertations annexed: and though he does not appear to have communicated any paper for the Philoſophical Tranſactions, he was, on the 30th of April 1772, elected a fellow of the Royal Society. On occaſion of taking his Maſter's degree in the univerſity in 1773, he compoſed an oration, intending to have ſpoken it in the theatre. The ſpeech was publiſhed 10 years after, and the topics that characterize it are, "an ardent love of liberty, an enthuſiaſtic veneration for the univerſity, a warm and diſcriminate eulogium on learned men, who devoted their talents and labours to the cauſe of religion, ſcience, and freedom." In the commencement of 1774, he publiſhed his commentaries on Aſiatic poetry, a work begun in 1766, and finiſhed in 1769, when he was in his 23d year, which "was received with admiration and applauſe by the oriental ſcholars of Europe in general, as well as by the learned of his own country." To theſe commentaries is annexed an elegant addreſs to the Muſe, in which Mr. Jones declares his purpoſe of renouncing polite literature, and devoting himſelf altogether to the ſtudy of the law. In January 1774 he was called to the bar; and for ſome years he ſeems to have inflexibly adhered to the above-mentioned reſolutions. For ſome time he declined practice, and ſedulouſly applied himſelf to his legal ſtudies. In 1775, for the firſt time, he attended the ſpring circuit and ſeſſions at Oxford; perhaps more as a ſpectator than an actor; and in the following year he was regular in his attendance at Weſtminſter-hall. In 1778 he publiſhed a tranſlation of the ſpeeches of Iſæus, in cauſes concerning the law of ſucceſſion to property at Athens, with a prefatory diſcourſe, notes critical and hiſtorical, and a commentary. The year

1784

1784 forms an intereſting era in the memoirs of Mr. Jones. His profeſſional practice had increaſed, and afforded a proſpect of farther enlargement with augmented profit; but as his views were particularly directed to the vacant ſeat on the bench of Fort William in Bengal, and as lord North had encouraged his expectation of occupying it, he was leſs anxious about the augmentation of buſineſs in his legal profeſſion. In this ſtate of ſuſpence, the political events of the times engaged his attention. To the American war, in its commencement and further progreſs, he was decidedly adverſe. At this time the reflections which he indulged dictated a very animated and claſſical ode to liberty, which he compoſed in Latin, and publiſhed under the title of "Julii Meleſigoni ad Libertatem," the aſſumed name being formed by a tranſpoſition of the letters of Gulielmus Joneſius. This ode ſtrongly diſplays his genius, erudition, feelings, and political principles. The vacancy of a ſeat in parliament for the univerſity of Oxford being likely to occur, Mr. Jones was encouraged by his friends to offer himſelf as a candidate; but though he was ambitious of this honour, the diſappointment gave him no great concern. Although this conteſted election occupied a conſiderable portion of his thoughts and time, he found leiſure to publiſh a ſmall pamphlet, entitled "An Inquiry into the legal Mode of ſuppreſſing Riots, with a conſtitutional Plan of future Defence." In a ſpeech, eminently characteriſtic of his principles and feelings, which he intended to have delivered at a meeting of the freeholders of Middleſex, aſſembled Sept. 9th of this year, for nominating two repreſentatives in the new parliament, he reprobated the American war and the conduct of the late parliament in ſupporting it: he expreſſed his ſentiments without reſerve on the African ſlave trade, and avowed the conduct which he would have purſued, if he had been placed in the houſe of commons. In the courſe of this year, the death of his mother, to whom he was attached by every poſſible tie of nature, affection, and gratitude, involved him in the deepeſt affliction. In this and the following year he was diligently employed in his profeſſional ſtudies and practice, whilſt literature and politics alſo engaged a degree of his attention; but the principal object of his ambition and hopes was the vacant ſeat on the bench in India. Whatever was connected with this object intereſted his thoughts; and hence he was led to undertake the tranſlation of an Arabian poem on the Mohammedan law of ſucceſſion to the property of inteſtates. In the year 1782 the public attention was much occupied with attempts to procure, by conſtitutional means, a reformation of parliament. This was a buſineſs congenial to Mr. Jones's ſentiments and feelings; and he concurred in the public efforts for this purpoſe, both by ſpeaking and writing. About this time he publiſhed his "Eſſay on the Law of Bailments;" and in the ſame year, 1782, he became a member of the Society for Conſtitutional Information. In his letter of acknowledgment for being elected into this ſociety, he profeſſes his attachment to the excellent conſtitution of his country; and then adds, "on the people depend the welfare, the ſecurity, and the permanence of every legal government; in the people muſt reſide all ſubſtantial power; and to the people muſt all thoſe, in whoſe ability and knowledge we ſometimes wiſely, often imprudently, confide, be always accountable for the due exerciſe of that power with which they are for a time entruſted." Whilſt he was at Paris, in the year 1782, he wrote a little "jeu d'eſprit," as he calls it; and of which he ſays, in a letter to lord Althorp, "it was printed here by a ſociety, who, if they will ſteer clear of party, will do more good to Britain, than all the philoſophers and antiquaries of Somerſet houſe. But to ſpeak the truth, I greatly doubt, whether they, or any other man in this country, can do it ſubſtantial good. The nation, as Demoſthenes ſays, will be fed like a conſumptive patient, with chicken broth and panada, which will neither ſuffer him to expire, nor keep him wholly alive." This "jeu d'eſprit" was a "Dialogue between a Farmer and Country Gentleman on the Principles of Government." After a bill of indictment had been found againſt the dean of St. Aſaph, for the publication of the edition, which was printed in Wales, ſir William Jones ſent a letter to lord Kenyon, then chief-juſtice of Cheſter, in which he avowed himſelf to be the author of the dialogue, and maintained that every poſition in it was ſtrictly conformable to the laws and conſtitution of England. In the beginning of 1783, Mr. Jones publiſhed his tranſlation of the ſeven Arabian poems, which he had finiſhed in 1781. The moſt intereſting period of Mr. Jones's life was now approaching; for in March 1783, by the active friendſhip of lord Aſhburton, and under the adminiſtration of lord Shelburne, he was appointed a judge of the ſupreme court of judicature at Fort William in Bengal, on which occaſion he received the honour of knighthood; and in the April following, he married Anna Maria Shipley, the eldeſt daughter of the biſhop of St. Aſaph, a lady to whom he had been long attached, who deſerved his moſt affectionate eſteem, who contributed in a very high degree to his domeſtic happineſs, and who lamented his death with a moſt pungent and permanent grief. To the publications of ſir William Jones, which we have already noticed, we ſhall here add an abridged hiſtory of the life of Nadir Shah, in Engliſh, and a hiſtory of the Perſian language, intended to be prefixed to the firſt edition of his Perſian grammar.

Sir William Jones embarked for India in the Crocodile frigate, and in April 1783 left his native country. He was now in his 37th year, with his faculties in full vigour, in poſſeſſion of the appointment to which his views had been long directed, indulging the expectation of acquiring an ample independence, and having no reaſon to apprehend that the climate of India would be hoſtile to his conſtitution. He could not be ſorry to abandon the political diſcuſſions, that divided his friends and alienated them from one another; and which muſt have produced mutual ſhyneſs and reſerve between him and thoſe to whom he was in other reſpects attached; and which ſerved to agitate the whole country. He had with him a companion and friend, from whoſe ſociety he could not but derive the greateſt ſatisfaction and comfort, which kindred minds and united hearts are capable of receiving and communicating. In ſuch ſociety, and with ample reſources in his own mind, a kind of temporary baniſhment from his country would be tolerable, the long voyage would not be tedious and unintereſting, and a ſettlement for important and beneficial purpoſes in a foreign land would be regarded without anxiety and averſion. In September 1783 he landed ſafely at Calcutta, and was received with cordial congratulations by thoſe who were chiefly intereſted in his arrival. In the following December he entered upon his judicial functions, and at the opening of the ſeſſions, delivered to the grand jury his firſt charge, which was conciſe, elegant, appropriate, and conciliatory. Scientific objects, during the intervals of profeſſional duties, engaged his attention; and in order to combine the efforts of many in uſeful purſuits, he deviſed the inſtitution of a ſociety in Calcutta, ſimilar in its plan and objects to thoſe that have been eſtabliſhed in the principal cities of Europe. See SOCIETY.

In the year ſucceeding that of his arrival, ſir William Jones was attacked with a diſorder which exhauſted his ſtrength, and threatened his valuable life. As ſoon, however, as he was able to undertake it, he projected a journey to Benares, principally with a view of opening ſources of uſeful information. He proceeded by way of Moorſhedabad, Jungepore, Bhagilpoor, and Patna, to Benares. In the courſe of this journey his diſorder once and again returned upon him, and ſeemed to excite in his mind an apprehenſion of its fatal termination. That this was the caſe we infer from a prayer which he compoſed on this occaſion, and which is as follows :

" O thou beſtower of all good ! if it pleaſe thee to continue my eaſy taſks in this life, grant me ſtrength to perform them as a faithful ſervant ; but if thy wiſdom hath willed to end them by this thy viſitation, admit me, not weighing my unworthineſs, but through thy mercy declared in Chriſt, into thy heavenly manſions, that I may continually advance in happineſs, by advancing in true knowledge and awful love of thee, thy will be done !"

After a ſhort reſidence at Benares, he returned by the Ganges to Bhagilpoor ; and in his journey from hence to Calcutta, he viſited Gour, once the reſidence of the ſovereigns of Bengal. In a letter written to a friend after his return, he ſays, " As we approached Calcutta we perceived the difference of climate, and thought of Bhagilpoor with pleaſure and regret." " I am juſt returned," ſays he, in another letter, " as it were from the brink of another world, having been abſent near ſeven months ; and reduced to a ſkeleton by fevers of every denomination, with an obſtinate bilious flux at their heels. My health is tolerably reſtored by a long ramble through South Bahar, and the diſtrict of Benares." During this tour he wrote two tracts ; one a little tale in verſe, under the title of " The Enchanted Maid," or " Hindu Wife ;" and the other, " A Treatiſe on the Gods of Greece, Italy, and India," afterwards preſented to the Society, and publiſhed in the Aſiatic Reſearches. The deſign of this work is to evince a reſemblance, too ſtrong to have been accidental, between the popular worſhip of the old Greeks and Italians, and that of the Hindus, and between their ſtrange religion and that of Egypt, China, Perſia, Phrygia, Phœnicia, and Syria, and even remoter nations. This reſemblance, if it were eſtabliſhed, would authoriſe, as ſir William Jones conceives, an inference of a general union and affinity between the moſt diſtinguiſhed inhabitants of the primitive world, at the time when they deviated, as they did too early deviate, from the rational adoration of the only true God. Sir William Jones, with his reſtored health, reſumed his functions in the ſupreme court of judicature, and renewed the meetings of the ſociety, interrupted by his abſence. The ſociety of ſir William Jones was ſo much valued and ſought for, and he was ſubject to ſo many intruſions, that, for the ſake of enjoying the benefit of air and exerciſe, and of purſuing his literary purſuits without interruption, he made choice of a reſidence at Criſhnagur, where the ſoil was dry, and the air pure. To the Aſiatic Miſcellany, a periodical work undertaken at Calcutta in 1785, but altogether unconnected with the Aſiatic ſociety, ſir W. Jones contributed occaſional compoſitions. Sir William, having long propoſed making an excurſion to Chatigan, the eaſtern limit of the Britiſh dominions in Bengal, executed his deſign after the receſs of the court in the beginning of 1786, and repaired thither by ſea. During his ſhort reſidence at Chatigan, he found leiſure, amidſt other occupations, to peruſe twice the heroic poem of Ferdoſi, the Homer of Perſia, ſuppoſed to contain 60,000 couplets. But the work to which his principal attention and labour were directed, was a tranſlation of the Hindu and Mohammedan laws. Accordingly, in one of his letters, he ſays, " Sanſcrit and Arabic will enable me to do this country more eſſential ſervice, than the introduction of arts, (even if I ſhould be able to introduce them,) by procuring an accurate digeſt of Hindu and Mohammedan laws, which the natives hold ſacred, and by which both juſtice and policy require that they ſhould be governed." Accordingly, he addreſſed a letter to the governor-general, lord Cornwallis, on this ſubject. The marquis Cornwallis conſidered the accompliſhment of the propoſed plan, as calculated to reflect the higheſt honour on his adminiſtration. With this ſanction ſir W. Jones entered on the execution of the work ; and having carefully ſelected, from the moſt learned Hindus and Mohammedans, a ſufficient number of perſons duly qualified for the taſk of compilation, he traced the plan of the digeſt, preſcribed its arrangement, and pointed out the MSS. from which it was to be formed. Although it is much to be regretted that ſir W. Jones did not live to tranſlate the digeſt of Hindu law, to the compilation of which he had devoted ſo much attention and labour ; yet it is ſatisfactory to know, that his benevolent intentions have not been diſappointed, and that Mr. H. T. Colebrooke, in the civil ſervice of the Eaſt India company at Bengal, from motives of public ſpirit, and a laudable hope of diſtinction, has completed a tranſlation of it with an ability which does him the higheſt credit. Sir W. Jones ſuggeſted an improvement in the police at Calcutta, ſo as to render it more efficient, and more conformable to the Britiſh conſtitution. His ſuggeſtions were adopted in an application to parliament, and confirmed by its ſanction. The application of ſir W. was inceſſant ; and after what he calls his " ſeaſoning," the ſtate of his health allowed his devoting ſeven hours a day for four or five months in the year to profeſſional engagements, and unremitted attention, during the vacations, to a complete knowledge of India, which was to be obtained only in the country itſelf, where it was his intention not to prolong his ſtay beyond the laſt year of the eighteenth century. Among other literary occupations which engaged his attention, he undertook the charge of editing the elegant poem of Hatefi, on the unfortunate loves of Laili and Majnon, an Arabian youth and princeſs. He publiſhed the book at his own expence, and appropriated the profits of the ſale to the relief of inſolvent debtors in the gaol at Calcutta. The buſineſs that was devolved upon him as preſident of the ſociety at Calcutta, and in conſequence of preparing the various excellent papers which he contributed to it, will be more particularly noticed in our account of that *Society*. In the year 1789, ſir William preſented to the public a tranſlation of an ancient Indian drama, entitled " Sacontala," or the " Fatal Ring," exhibiting a very pleaſing and authentic picture of old Hindu manners, and one of the greateſt curioſities that the literature of Aſia had yet brought to light. Calidas, the author of it, called by ſir W. the Shakſpeare of India, lived in the firſt century B. C., and wrote ſeveral other dramas and poetical pieces. The principal ſources of amuſement of which ſir W. availed himſelf, was the converſation of the Pundits, with whom he talked freely, in the language of the gods (Sanſcrit), and botany, in which latter ſtudy, if it may be ſo called, he was much aſſiſted by lady Jones. Their evenings were generally paſſed together, and devoted to the peruſal of the beſt modern authors in the different languages of Europe. We find, however, from ſeveral of his letters, that he felt great anxiety concerning the debilitated ſtate of her health, and that, painful as muſt be their mutual ſeparation, he had engaged her promiſe to take her paſſage for Europe in January 1793. Such was her affectionate attachment to her huſband, that ſhe remained in India in oppoſition to the advice of her phyſicians, though ſhe could entertain no reaſonable expectation of recovering her health in the climate of that country. It was finally ſettled, however, that ſhe ſhould return to England ; and it was his determination to follow her in the enſuing ſeaſon, hoping at that period to have diſcharged his engagements with the government of India, and intending to purſue his reſearches through Perſia or China by a circuitous route, to his native country. Lady Jones embarked in December 1793. Soon after her departure, *viz.* in the beginning of 1794, ſir William Jones publiſhed a tranſlation of the Ordinances of Menu, compriſing the Indian ſyſtem of duties, religious and civil. In this work he had been long engaged from motives ſimilar to thoſe which had induced him to undertake the compilation of the digeſt; *viz.* to aid the benevolent intentions of the legiſlature of Great Britain, in ſecuring to the natives of India the adminiſtration of juſtice, to a certain extent, by their own laws.

To thoſe who entertain a juſt ſenſe of the importance of the principles and the utility of the duties of religion, the following prayer, compoſed by ſir W. Jones on the firſt day of the year 1782, about fifteen months before his embarkation for India, and more than twelve years before his death, will not be unacceptable:——"Eternal and incomprehenſible *Mind*, who, by thy boundleſs *power*, before time began, createdſt innumerable *worlds*, for thy *glory*, and innumerable orders of *beings* for their *happineſs*, which thy infinite *goodneſs* prompted thee to deſire, and thy infinite *wiſdom* enabled thee to know! We, thy *creatures*, vaniſh into nothing before thy ſupreme majeſty; we hourly feel our *weakneſs;* we daily bewail our *vices;* we continually acknowledge our *folly;* thee only we *adore* with awful veneration; thee we thank with the moſt fervent zeal; thee we *praiſe* with aſtoniſhment and rapture; to thy *power* we humbly ſubmit; of thy *goodneſs* we devoutly implore protection; on thy *wiſdom* we firmly and cheerfully rely. We do but open our *eyes*, and inſtantly we perceive thy divine exiſtence; we do but exert our *reaſon*, and in a moment we diſcover thy divine *attributes;* but our eyes could not behold thy *ſplendour*, nor could our *minds* comprehend thy divine *eſſence;* we *ſee* thee *only* through thy ſtupendous and all-perfect *works;* we *know* thee *only* by that ray of ſacred light which it has pleaſed thee to reveal. Nevertheleſs, if creatures too *ignorant* to *conceive*, and too *depraved* to *purſue*, the means of their own happineſs, may, without preſumption, expreſs their wants to their CREATOR, let us humbly ſupplicate thee to remove from us that *evil*, which thou haſt permitted for a *time* to exiſt, that the *ultimate good* of all may be complete, and to ſecure us from that *vice*, which thou ſuffereſt to ſpread ſnares around us, that the triumph of virtue may be more conſpicuous. Irradiate our minds with all *uſeful truth;* inſtil into our hearts a ſpirit of *general benevolence;* give *underſtanding* to the fooliſh; *meekneſs* to the proud; *temperance* to the diſſolute; *fortitude* to the feeble-hearted; *hope* to the deſponding; *faith* to the unbelieving; *diligence* to the ſlothful; *patience* to thoſe who are in *pain;* and thy celeſtial aid to thoſe who are in *danger:* comfort the *afflicted;* relieve the *diſtreſſed;* ſupply the *hungry* with ſalutary food; and the *thirſty* with a plentiful ſtream. Impute not our *doubts* to indifference, nor our *ſlowneſs of belief* to *hardneſs of heart;* but be indulgent to our *imperfect nature*, and ſupply our *imperfections* by thy *heavenly favour*. 'Suffer not, we anxiouſly pray, ſuffer not *oppreſſion* to prevail over *innocence*, nor the *might* of the *avenger* over the *weakneſs* of the *juſt.*' Whenever we addreſs thee in our retirement from the vanities of the world, if our prayers are *fooliſh*, *pity* us; if *preſumptuous*, *pardon* us; if *acceptable* to thee, grant them, all-powerful God, grant them; and, as with our *living* voice, and with our *dying* lips, we will expreſs our ſubmiſſion to thy *decrees*, adore thy *providence*, and bleſs thy *diſpenſations;* ſo in all *future* ſtates, to which we reverently hope thy *goodneſs* will raiſe us, grant that we may continue *praiſing, admiring, venerating, worſhipping* thee more and more, through *worlds* without *number*, and *ages* without *end!*" This prayer is undoubtedly the effuſion of a truly pious mind, impreſſed with juſt ſentiments of the Deity and of human nature; and though it does not expreſs any explicit faith in the doctrines of Chriſtianity, theſe ſentiments are ſuch as reaſon and experience ſuggeſt, and ſuch as revelation expreſsly teaches us. It ſhould alſo be recollected, that long before this prayer was written, ſir W. Jones had demonſtrated, as we have already obſerved, to his own ſatisfaction, that Jeſus was the Meſſiah predicted by the prophets. We have alſo farther evidence, which no incredulity can conteſt, of his firm belief in the divine authority of the ſcriptures and divine miſſion of Jeſus Chriſt. Of the ſacred writings, he ſays, in a paſſage tranſcribed from his own MS. in his bible: "I have carefully and regularly peruſed theſe holy ſcriptures, and am of opinion, that the volume, independently of its divine origin, contains more ſublimity, purer morality, more important hiſtory, and finer ſtrains of eloquence, than can be collected from all other books, in whatever language they may have been written." It would indeed be endleſs to cite paſſages from his writings, which demonſtrate his ſentiments on the ſubject of revelation, and at the ſame time his earneſt ſolicitude to impreſs his own belief on others. In this connection we cannot forbear tranſcribing a paſſage from the Memoirs of his biographer, which do honour to his judgment and his heart.

"In matters of eternal concern," ſays lord Teignmouth, "the authority of the higheſt human opinions has no claim to be admitted, as a ground of belief; but it may, with the ſtricteſt propriety, be oppoſed to that of men of inferior learning and penetration; and, whilſt the pious derive ſatisfaction from the peruſal of ſentiments according with their own, thoſe who doubt or diſbelieve, ſhould be induced to weigh, with candour and impartiality, arguments which have produced conviction in the minds of the beſt, the wiſeſt, and the moſt learned of mankind."

After the departure of lady Jones, "whoſe ſociety had ſweetened the toil of application, and cheered his hours of relaxation," ſir William mixed more in promiſcuous ſociety; "but his affections were tranſported with her to his native country," and, without doubt, led him to anticipate, with an anxiety blended with delight, the period which he had fixed in his own mind for leaving India, and renewing his intercourſe with her, and with other friends. But Providence had otherwiſe determined. On the evening of the 20th of April, or nearly about that date, in 1794, he prolonged his walk to a late hour; in conſequence of which he complained of aguiſh ſymptoms; but feeling no alarm he jocularly repeated an old adage; "An ague in the ſpring is medicine for a king." But his complaint, of which he had no apprehenſion, was that which is common in Bengal, *viz.* an inflammation in the liver. The medicines preſcribed by the phyſician who attended him, and who ſoon diſcovered the nature of his diſorder, were adminiſtered without effect. The progreſs of the diſeaſe was uncommonly rapid, and terminated fatally on the 27th of April 1794. His biographer found him, on the morning of that day, "lying on his bed in a poſture of meditation; and the only ſymptom of remaining life was a ſmall degree of motion in the heart, which after a few ſeconds ceaſed, and he expired without a pang or groan. His bodily ſuffering, from the complacency of his features and the eaſe of his attitude, could not have been ſevere; and his mind muſt have derived conſolation from thoſe ſources where he had been in the habit of ſeeking it, and where alone, in our laſt moments, it can ever be found."

found." On the following day the funeral ceremony was performed, "with the honours due to his public ſtation; and the numerous attendance of the moſt reſpectable Britiſh inhabitants of Calcutta evinced their ſorrow for his loſs, and their reſpect for his memory."

The following epitaph, evidently intended for himſelf, was written by ſir William Jones, not long before his demiſe. It diſplays ſome ſtriking features of his character, reſignation to the will of his Creator, love and good-will to mankind; but it is modeſtly ſilent upon his intellectual attainments.

Here was depoſited
the mortal part of a man,
who feared God, but not Death;
and maintained independence,
but ſought not riches;
who thought
none below him, but the baſe and unjuſt,
none above him, but the wiſe and virtuous;
who loved
his parents, kindred, friends, and country,
with an ardour
which was the chief ſource of
all his pleaſures and all his pains;
and who, having devoted
his life to their ſervice,
and to
the improvement of his mind,
reſigned it calmly,
giving glory to his Creator,
wiſhing peace on earth,
and with
good will to all creatures,
on the [*Twenty-ſeventh*] day of [*April*]
in the year of our bleſſed Redeemer
One thouſand ſeven hundred [*and ninety-four.*]

By an unanimous vote of the Court of Directors of the Eaſt India Company, it was reſolved, that a monument to his memory ſhould be ordered, for the purpoſe of being erected in St. Paul's cathedral, with a ſuitable inſcription; and that a ſtatue of ſir William Jones ſhould be prepared at the expence of the company, and ſent to Bengal, with directions for its being placed in a proper ſituation there. A ſociety of gentlemen in Bengal, who had received their education at Oxford, ſubſcribed a ſum to be given, as a prize, for the beſt diſſertation on his character and merits, by any of the ſtudents of that univerſity; and the premium was adjudged to Mr. Henry Philpotts, A. M. Fellow of Magdalen college. Lady Jones teſtified her affection for ſir William, and her deſire to perpetuate his fame, by an elegant monument erected, at her expence, in the anti-chamber of Univerſity college, Oxford, and by the publication of his works in an elegant edition of ſix 4to. volumes; thus ſtrictly conforming to his opinion, that "the beſt monument that can be erected to a man of literary talents, is a good edition of his works."

"In the ſhort ſpace of 47 years," ſays his biographer, "by the exertion of rare intellectual talents, he acquired a knowledge of arts, ſciences, and languages, which has ſeldom been equalled, and ſcarcely, if ever, ſurpaſſed." Without conſidering him as a competitor in Grecian literature with a Porſon or a Parr, he deſerves to be ranked high among claſſical ſcholars; and "as a philologiſt, he could boaſt an univerſality in which he had no rival. His ſkill in the idioms of India, Perſia, and Arabia, has perhaps never been equalled by any European; and his compoſitions on oriental ſubjects diſplay a taſte, which we ſeldom find in the writings of thoſe who had preceded him in theſe tracts of literature. The language of Conſtantinople was alſo familiar to him; and of the Chineſe characters and tongue, he had learned enough to enable him to tranſlate an ode of Confucius. In the modern dialects of Europe, French, Italian, Spaniſh, Portugueſe, and German, he was thoroughly converſant, and had peruſed the moſt admired writers in thoſe languages." The following tranſcript of a paper written by himſelf, will inform us, how far his knowledge of languages extended;

LANGUAGES:

Eight languages ſtudied critically;
English, Latin, French, Italian,
Greek, Arabic, Perſian, Sanſcrit.

Eight ſtudied leſs perfectly, but all intelligible with a dictionary;

Spaniſh, Portugueſe, German, Runick,
Hebrew, Bengali, Hindi, Turkiſh.

Twelve ſtudied leſs perfectly, but all attainable;

Tibetian, Pâli, Phalavi, Deri,
Ruſſian, Syriac, Ethiopic, Coptic,
Welſh, Swediſh, Dutch, Chineſe.

Twenty-eight languages.

In another memorandum, he mentions having read a grammar of the Ruſſian and Welſh. The knowledge of languages, however, was, in ſir W. Jones's eſtimation, inferior and ſubordinate to other objects. They were, in his poſſeſſion, the keys of univerſal literature and ſcience, and ſerved, according to the uſe which he made of them, to unlock ſtorehouſes of ancient and modern treaſures, for the amuſement, inſtruction, and general benefit of mankind. The eleven diſcourſes which he addreſſed to the Aſiatic ſociety, and to which we ſhall have occaſion to refer under future articles, are ſpecimens of the uſes to which he applied them.

"A mere catalogue of the writings of ſir William Jones," ſays his biographer, "would ſhew the extent and variety of his erudition; a peruſal of them will prove, that it was no leſs deep than miſcellaneous. Whatever topic he diſcuſſes, his ideas flow with eaſe and perſpicuity, his ſtyle is always clear and poliſhed; animated and forcible, when his ſubject requires it. His philological, botanical, philoſophical, and chronological diſquiſitions, his hiſtorical reſearches, and even his Perſian grammar, whilſt they fix the curioſity and attention of the reader, by the novelty, depth, or importance of the knowledge diſplayed in them, always delight by elegance of diction. His compoſitions are never dry, tedious, nor diſguſting; and literature and ſcience come from his hands, adorned with all their grace and beauty. No writer, perhaps, ever diſplayed ſo much learning, with ſo little affectation of it." With regard to his law publications, it is ſaid, that his "Eſſay on Bailements" was ſanctioned by the approbation of lord Mansfield; and all his writings in this department ſhew, that he had thoroughly ſtudied the principles of law as a ſcience. As to his opinion of the Britiſh conſtitution, it appears from repeated declarations that occur in his letters, and particularly in his 10th diſcourſe, delivered to the Aſiatic ſociety in 1793, that he conſidered it as the nobleſt and moſt perfect that ever was formed. With regard to his political principles, he was an enlightened and decided friend to civil and religious liberty. Like many others of the ſame principles, he entertained a favourable opinion of the French revolution at its commencement,

ment, and wiſhed ſucceſs to the exertions of that nation for the eſtabliſhment of a free conſtitution: but ſubſequent events muſt have given him new views, not ſo much of the principles on which the revolution was founded, as of the meaſures which have been adopted by ſome of its zealous partizans. To liberty, indeed, his attachment was enthuſiaſtic, and he never ſpeaks of tyranny or oppreſſion, but in the language of deteſtation. He dreaded, and wiſhed to reſtrain every encroachment on liberty; and though he never enliſted under the banners of any party, he always concurred in judgment and exertion with thoſe who wiſhed to render pure and permanent the conſtitution of his country. With this view he was a zealous advocate for a reformation in the repreſentation of the country, as the only means of reſtoring the balance of the conſtitution, and in one of his letters to lord Althorp, he expreſsly declares, that "on the popular part of every government depend its real force, the obligation of its laws, its welfare, its ſecurity, its permanence." The laſt political publication of ſir W. Jones is prior to the year 1783.

As a judge in India, his conduct was ſtrictly conformable to the profeſſions which he made in his firſt charge to the grand jury at Calcutta. "On the bench he was laborious, patient, and diſcriminating; his charges to the grand jury, which do not exceed ſix, exhibit a veneration for the laws of his country; a juſt and ſpirited encomium on the trial by jury, as the greateſt and moſt invaluable right derived from them to the ſubject; a deteſtation of crimes, combined with mercy to the offender; occaſional elucidations of the law; and the ſtrongeſt feelings of humanity and benevolence. His knowledge of the Sanſcrit and Arabic eminently qualified him for the adminiſtration of juſtice in the ſupreme court, by enabling him to detect miſrepreſentations of the Hindu or Mohammedan laws, and to correct impoſitions in the form of adminiſtering oaths to the followers of Brahma and Mohammed. The inflexible integrity with which he diſcharged the ſolemn duty of this ſtation will long be remembered in Calcutta, both by Europeans and natives.

Having through life directed his attention to various branches of literature and ſcience, in all which he had made conſiderable proficiency, his laſt and favourite purſuit was the ſtudy of botany; and this conſtituted the principal amuſement of his leiſure hours.

It might naturally be inquired by what arts or method he was enabled to attain that extraordinary degree of knowledge for which he was diſtinguiſhed. His faculties were naturally vigorous and ſtrengthened by exerciſe; his memory, as we have before obſerved, was, from early life, ſingularly retentive; his emulation was ardent and unbounded; and his perſeverance invincible. In India his ſtudies began with the dawn; and, with the intermiſſion of profeſſional duties, were continued throughout the day. Another circumſtance, which has been exemplified in ſome other inſtances that might be mentioned, and which gave him peculiar advantage in the exerciſe of his talents, was "the regular allotment of his time to particular occupations, and a ſcrupulous adherence to the diſtribution which he had fixed;" ſo that "all his ſtudies were purſued without interruption or confuſion." With ſir W. Jones it was a favourite opinion, "that all men are born with an equal capacity for improvement." Accordingly ſir I. Newton modeſtly declared, "that if he had done the world any ſervice, it was due to nothing but induſtry and patient thought." Sir W. Jones having maintained the above-mentioned opinion in converſation with a friend, Thomas Law, eſq. received the following unpremeditated reply:

"Sir William, you attempt, in vain,
By depth of reaſon to maintain,
That all men's talents are the ſame,
And they, not nature, are to blame.
Whate'er you ſay, whate'er you write,
Proves your opponents in the right.
Leſt genius ſhould be ill-defin'd
I term it *your ſuperior mind*,
Hence to your friends 'tis plainly ſhewn,
You're ignorant of yourſelf alone."

Sir William Jones's Anſwer.

"Ah! but too well, dear friend, I know
My fancy weak, my reaſon ſlow,
My memory by art improv'd,
My mind by baſeleſs trifles mov'd.
Give me (thus high my pride I raiſe)
The ploughman's or the gardener's praiſe,
With patient and unceaſing toil,
To meliorate a ſtubborn ſoil,
And ſay, (no higher meed I aſk,)
With zeal haſt thou perform'd thy taſk.
Praiſe, of which virtuous minds may boaſt,
They beſt confer, who merit moſt."

Beſides the finiſhed productions of ſir William Jones's ſkill and labour, he had contemplated many more than he had executed: and for this reaſon, as well as many others, we cannot forbear regretting his premature death.

It is needleſs to add any thing in commendation of his private and ſocial virtues. The independence of his integrity, his probity and humanity, and alſo his univerſal philanthropy and benevolence, are acknowledged by all who knew him. The compiler of this article joins with many others in a grateful and reſpectful remembrance of his diſpoſition to perform acts of kindneſs; and he has reaſons, peculiar to himſelf, for regretting his premature death. In every domeſtic relation, as a ſon, a brother, and a huſband, he was attentive to every dictate of love, and to every obligation of duty. In his intercourſe with the Indian natives, he was condeſcending and conciliatory; liberally rewarding thoſe who aſſiſted him, and treating his dependents as friends. His biographer records the following anecdote of a circumſtance that occurred after his demiſe: "the Pundits who were in the habit of attending him, when I ſaw them at a public *durbar*, a few days after that melancholy event, could neither reſtrain their tears for his loſs, nor find terms to expreſs their admiration at the wonderful progreſs which he had made, in the ſciences which they profeſſed." Upon the whole, we may join with Dr. Parr, who knew his talents and character, in applying to ſir William Jones his own words: "It is happy for us that this man was born."

Having attained, by the aſſiduous exertion of his abilities, and in a courſe of uſeful ſervice to his country and mankind, a high degree of reputation; and by economy that did not encroach upon his beneficence, a liberal competence, he was prepared, one would have thought, at the age of 47 years, to enjoy dignity with independence. His plans, and the objects of his purſuit, in the proſpect of future life, were various and extenſive; and he would naturally indulge many pleaſing ideas in the view of returning, at a fixed period, to his native country, and to beloved friends, who would anxiouſly wiſh for his arrival. Few perſons ſeemed to be more capable of improving and enjoying prolonged life than ſir William Jones; and few perſons ſeemed to be better prepared for a more exalted ſtate of progreſſive improvement, and of permanent felicity, than that to which the moſt diſtinguiſhed and proſperous can attain within the regions of mortality.

We ſhall cloſe this article with obſerving that lady Jones, ſince the demiſe of ſir William, has preſented to the Royal Society a collection of MSS. Sanſcrit and Arabic, which he reckoned ineſtimable, and alſo another large collection of Eaſtern MSS.; of which a catalogue, compiled by Mr. Wilkins, is inſerted in the 13th volume of ſir William Jones's Works, 8vo. ed.

JONES, *Sir* THOMAS, lord chief juſtice of the Common Pleas in the reigns of Charles II. and James II., is celebrated for his reply to the latter, who conſulted him on his diſpenſing power, and ſaid he could ſoon have twelve judges of his opinion: ſir Thomas anſwered, "Twelve judges you may poſſibly find, ſir, but not twelve lawyers." He was author of Reports. Granger.

JONES, JEREMIAH, a learned Engliſh non-conformiſt divine in the eighteenth century, is ſuppoſed to have been born about the year 1693. It is not known where he received his grammar learning, but he was, at an early age, diſtinguiſhed for his proficiency in uſeful knowledge. He purſued his academical ſtudies under the tuition of his uncle, the Rev. Samuel Jones of Tewkſbury, in Glouceſterſhire, from whoſe ſeminary many pupils were ſent into the world, who became diſtinguiſhed for their literature or rank in life. Among theſe were Butler, afterwards biſhop of Durham; Secker, afterwards archbiſhop of Canterbury; and Samuel Chandler, miniſter of the Old Jewry meeting-houſe. When Mr. Jones had finiſhed his courſe of academical learning, he ſettled with a congregation of Proteſtant Diſſenters at Avening, in Glouceſterſhire. He obtained a high character for ſound and very extenſive learning; and he was popular as a preacher. Though a hard ſtudent and a profound ſcholar his manners were not ſevere or forbidding: he would even relax from his ſtudies and join a party in his neighbourhood in the exerciſe of bowls. He died in 1724, when he was only in his thirty-firſt year. During his life he publiſhed "A Vindication of the former Part of St. Matthew's Goſpel, &c." But his moſt valuable and important work, which he had prepared for the preſs before his death, but which was not publiſhed till the year 1726, was his "New and full Method of ſettling the Canonical Authority of the New Teſtament." The works of Mr. Jones remain as monuments of his learning, ingenuity, and indefatigable induſtry, and would have done credit to the aſſiduity and ability of a literary man of ſixty. They were become exceedingly ſcarce, and bore a very high price, when, about ten years ſince, the conductors of the Clarendon preſs republiſhed them. "Mr. Jones," obſerves Dr. Maltby, "has brought together, with uncommon diligence and judgment, the external evidence for the authenticity of the canonical books; and he has, with equal ability and fairneſs, ſtated his reaſons for deciding againſt the apocryphal." Had his life been ſpared, Mr. Jones would have drawn up another and diſtinct volume on the apoſtolical fathers. Monthly Magazine.

JONES, WILLIAM, a worthy clergyman of the church of England, was born at Lowick, in Northamptonſhire, in the year 1726. He laid a good foundation of grammar learning in the country, and when he was of a proper age he was admitted a ſcholar at the Charter-Houſe in London, where he made a rapid progreſs in the Latin and Greek languages, and at the ſame time ſhewed a turn for philoſophical purſuits. When he was about eighteen years of age, he was entered of Univerſity college, Oxford, and in this ſeminary he purſued the uſual courſe of ſtudies with unremitted diligence. Here he adopted the Hutchinſonian opinions in theology and natural philoſophy. Mr. Jones was admitted to the degree of B. A. in the year 1749, and was, in the ſame year, admitted to deacon's orders. In 1751, he was ordained prieſt, and in 1753, he publiſhed his "Full Anſwer to Biſhop Clayton's Eſſay on Spirit," in which he endeavoured to ſupport the cauſe of orthodoxy by an appeal to the religion and learning of heathen antiquity. His next work was entitled the "Catholic Doctrine of the Trinity," which was favourably received by the orthodox party. He now engaged in a courſe of experiments with the view of elucidating and eſtabliſhing his favourite theory. In this he was liberally ſupported by friends who ſubſcribed among themſelves very large ſums to enable him to purchaſe ſuch an apparatus as he ſtood in need of. The reſult of his labours was "An Eſſay on the firſt Principles of Natural Philoſophy," publiſhed in 1762. In the year 1764, he was preſented by archbiſhop Secker with the vicarage of Betherſden, in Kent. Here, to increaſe his income, he undertook the tuition of a few pupils, an office for which he was admirably qualified. In 1765, the archbiſhop preſented him to the rectory of Pluckley, where he continued his plan of education, and at the ſame time diſcharged the paſtoral duties with exemplary zeal and diligence. In the year 1769, he publiſhed "A Letter to a Young Gentleman at Oxford, intended for Holy Orders, containing ſome ſeaſonable Cautions againſt Errors in Doctrine." From this time, to the year 1781, he publiſhed ſeveral other pieces, chiefly theological, and in the latter year he gave the world his "Phyſiological Diſquiſitions, or Diſcourſes concerning the Natural Philoſophy of the Elements." This work contains much inſtructive, and much fanciful matter, ingeniouſly applied in an attempt to inveſtigate the cauſes of things, and to conſtruct a theory of nature on the principles of the author's favourite ſyſtem. His next publication was theological; it conſiſted of lectures on the figurative language of the Holy Scriptures, and the interpretation of it from the Scripture itſelf. This was publiſhed in 1788, and, in 1790, he gave the public two volumes of ſermons on moral and religious ſubjects, which include diſcourſes on natural hiſtory, delivered at an annual lecture at Shoreditch church, of which the preacher is appointed by the Royal Society. In the year 1792 he employed his pen in the ſervice of politics, and printed a two-penny pamphlet, entitled "A Letter from Thomas Bull to his Brother John," which was moſt induſtriouſly circulated throughout the kingdom by the friends of adminiſtration. Mr. Jones attempted to form a ſociety "for the reformation of principles," but it did not ſucceed: he was the founder of the periodical publication entitled the "Britiſh Critic," and he edited a collection of tracts in two volumes, which had been originally publiſhed by Mr. Law, Mr. Norris, Dr. Horne, and others. This work was entitled "The Scholar armed againſt the Errors of the Time, or a Collection of Tracts on the Principles and Evidences of Chriſtianity, the Conſtitution of the Church, and Authority of civil Government." In 1795 he publiſhed "Memoirs of the Life, Studies, and Writings of the Right Reverend George Horne, D.D. late lord biſhop of Norwich," to the ſecond edition of which he prefixed a conciſe expoſition of Mr. Hutchinſon's leading theological and philoſophical opinions. His laſt publication was "A Diſcourſe on the Uſe and Intention of ſome remarkable Paſſages of Scripture, &c." Shortly after this, he ſuffered moſt ſeverely from a paralytic ſeizure, which at length, in February 1800, 1800, put an end to his life in the ſeventy-fourth year of his age. Mr. Jones's learning was very reſpectable, his attachment to truth was zealous and ardent, and his moral conduct highly exemplary. He delighted in doing good, and was a vigilant and affectionate paſtor. He was, in addition to his other learning, a proficient in muſic, and compoſed ten church-pieces for the organ, and four anthems, which have been much admired. His works have been publiſhed in 12 vols, 8vo. See Gentleman's Magazine for 1800.

Jones, Paul, a naval adventurer, was a native of Selkirk, in Scotland, but ſettling in America, he obtained, in 1775, the command of a ſhip under commodore Hopkins, and diſtinguiſhed himſelf in ſeveral engagements, on which account he received a captain's commiſſion. He then ſailed to France, and being well acquainted with the coaſt of Ireland, and the northern part of England, he conceived the deſign of effecting a deſcent. He accordingly landed at Whitehaven, and did conſiderable miſchief there. He afterwards ſailed for Scotland, where he landed on the eſtate of the earl of Selkirk, and plundered his lordſhip's houſe of all the plate: he next took the Drake ſloop of war, with which he went to Breſt. After this he ſailed round Ireland to the North ſea, with three ſhips, *viz.* the Richard, Pallas, and Vengeance. Having committed great miſchief on that coaſt, he fell in with the Baltic fleet, convoyed by the Serapis frigate, and another armed veſſel, both of which he captured off Flamborough-head. For theſe ſervices the king of France conferred on him the order of merit, and gave him a gold-hilted ſword. We hear no more of his exploits after the concluſion of the American war. He died at Paris in 1792. Monthly Mag.

Jones, in *Geography*, a county of North Carolina, in Newbern diſtrict, bounded N. by Craven, and well watered by the river Trent and its tributary ſtreams. It contains 4241 free inhabitants, and 1899 ſlaves. Its chief town is Trenton.

Jones, *St.*, a town of America, in Kent county, Delaware, containing 1586 inhabitants.

Jones's *Creek*, a river of Pennſylvania, which runs into the Delaware. N. lat. 40° 58′. W. long. 75° 15′.

Jones's *Iſland*, an iſland in Hudſon's bay. N. lat. 61° 52′. W. long. 63°.

Jones's *Key*, a ſmall iſland in the Spaniſh Main, near the Moſquito ſhore, ſurrounded with rocks. N. lat. 15° 35′. W. long. 82° 27′.

Jones's *Town*, in Pennſylvania. See Williamsburg.

JONESBOROUGH, a poſt-town of America, and chief town of Waſhington diſtrict, in Teneſſee, and alſo the ſeat of the diſtrict and county courts, 26 miles from Greenville and 40 from Abingdon, in Virginia.—Alſo, the chief and poſt-town of Camden county, Edenton diſtrict, North Carolina; containing a court-houſe and a few dwelling houſes.

JONESIA, in *Botany*, is a genus dedicated by Dr. Roxburgh to the memory of the celebrated ſir William Jones, who, amongſt the varied and unrivalled accompliſhments he attained in almoſt every department of ſcience, was by no means unſkilled in botanical reſearches. Roxb. Aſiat. Reſearches, v. 4. 355. Willd. Sp. Pl. v. 2. 287. (Aſjogam; Hort. Malabar. v. 5. 117. t. 59.) Claſs and order, *Heptandria Monogynia.* Nat. Ord. . . . . ?

Eſſ. Ch. Calyx of two leaves. Corolla funnel-ſhaped, with a cloſed, fleſhy tube; limb four-cleft. Nectary a little ring bearing the ſtamens, inſerted into the throat of the tube of the corolla. Germen pedicellated. Pod-ſhaped like a ſcymitar, turgid, containing from four to eight ſeeds.

1. J. *pinnata.* Willd. (J. Aſoca; Roxb. Aſiat. Reſearches, v. 4. 355.) A native of the Eaſt Indies.—This *tree* riſes to the height of about 15 feet. *Root* whitiſh, covered with a blackiſh *bark*, inodorous, firmly fixed in the ground and ſpreading by means of numerous fibres. *Leaves* alternate, unequally pinnate, conſiſting of from four to ſix pair of oblong-lanceolate, ſmooth, ſhining, ſtrong leaflets. *Flowers* making a denſe cyme, odorous, of a fine yellow colour. *Stamens* long and ſlender, of a beautiful ſhining red, with dark purple tops. *Style* greeniſh-white, with a round tip.

We have ſeen a beautiful ſpecimen of this plant which was gathered and preſerved by lord Valentia in his Travels through India; and this authorizes us to ſay that the *Aſjogam* of the *Hortus Malabaricus* is a moſt correct delineation of our *Joneſia.* It is found in gardens about Calcutta, where it grows to be a very handſome tree. The plants and ſeeds were originally brought from the interior of the country, where it is indigenous.

JONGLEURS, muſicians, players on inſtruments, in the infancy of French poetry, who attached themſelves to the troubadours or provincial poets.

The hiſtory of the French theatre informs us that a kind of merry-andrews were thus called that accompanied the troubadours, who began to flouriſh about the beginning of the eleventh century. The term jongleur ſeems to be a corruption of the Latin word *joculator*, in French *joueur*, and in Engliſh player on an inſtrument. Mention is made of the jongleurs from the time of the emperor Henry II., who died in 1056. As they played upon different inſtruments, they aſſociated with the troubadours and ſingers, to execute the works of the firſt, and thus, in their company they gained admiſſion into the palaces of kings and princes, and drew from them magnificent preſents. Some time after the death of Joan I. queen of Naples and Sicily, and counteſs of Provence, which happened 1382, all thoſe of the profeſſion of troubadours and jongleurs, ſeparated into two different claſſes of actors. Some, under the ancient name of *troubadours*, joined ſinging to inſtruments, or the recitation of voices; others ſimply took the name of players, or *joculators*, as they were named in their certificates.

About the year 1330, the minſtrels of Paris, including the jongleurs, formed themſelves into a company, and obtained a charter. The police frequently repreſſed their licentiouſneſs, and regulated their conduct: Philip Auguſtus baniſhed them the firſt year of his reign; but they were recalled by his ſucceſſors, and united under the general name of *meneſtraudie*, minſtrelſy; having a chief appointed over them, who was called *king of the minſtrels*. Lewis IX. exempted them from a tariff or toll at the entrance into Paris, on condition that they would ſing a ſong and make their monkies dance to the tollman, perhaps to prove their title to ſuch indulgence; and hence aroſe the well-known proverb: *Payer en gambades et en monnoïe de ſinge.*

The aſſociated minſtrels inhabited a particular ſtreet, to which they gave the name, which it ſtill retains, of *St. Julien des Meneſtriers.* It was here that the public was provided with muſicians for weddings and parties of pleaſure; but as a greater number of them uſually attended on ſuch occaſions than were ordered, and all expected to be paid the ſame price, William de Germont, provoſt of Paris, in 1331 prohibited the jongleurs and jonglereſſes from going to thoſe who required their performance in greater numbers than had been ſtipulated, upon a ſevere penalty. In 1395 their libertiniſm and immoralities again incurred the cenſure of government, by which it was ſtrictly enjoined that they ſhould henceforth, neither in public nor private, ſpeak, act, or ſing any thing that was indecorous or unfit for modeſt eyes and ears, upon pain of two months impriſonment, and living on bread and water.

Though the word *minſtrel*, in Engliſh, is confined to ſtrolling muſicians, players on inſtruments; yet the term jongleur, in old French, included buffoons, fortune-tellers, ſlight of hand, tumblers, &c. beſides *violars*, or performers on the violle or viol; *juglars*, or flute players; *muſars*, or players on other inſtruments; *comiques*, or comedians.

All theſe, at laſt, aſſumed the name of *jongleurs*, as the moſt ancient, and the women who followed this profeſſion were denominated jongleureſſes. They ſettled at Paris in one particular ſtreet, which thence was called "la rue des jongleurs," and which is ſtill called the ſtreet of "St. Julien des Menétriers." In that ſtreet people uſed to apply for performers on feſtivals, and for parties of pleaſure.

By an ordonnance of William of Clermont, provoſt of Paris, 14th Sept. 1395, the jongleurs were forbidden to utter, repreſent, or ſing in public places, or elſewhere, any thing that would occaſion ſcandal, on pain of fine and two months impriſonment. Since that time we hear no more of them, except their dancing and performing tricks with ſwords and other weapons. Theſe were called *batalores*, in Fr. *bateleurs*, merry-andrews; and, at length, tumblers and rope-dancers. See MINSTREL.

IONIA, in *Ancient Geography*, ſo called from the Ionians, who inhabited this part of Aſia Minor, was bounded on the N. by Æolia; on the W. by the Ægean and Icarian ſeas; on the S. by Caria; and on the E. by Lydia and part of Caria. It lies between the 37th and 40th degrees of north latitude, but its extent in longitude, which has not been accurately determined, was inconſiderable. The moſt remarkable cities of Ionia were Phocæa, Smyrna, Clazomenæ, Erythræ, Teos, Lebadus, Colophon, Epheſus, Priene, and Miletus. The iſlands of Chios and Samos were likewiſe inhabited by the Ionians, and belonged to their confederacy. See the next article.

IONIANS, conſtitute a claſs of people among thoſe who were the moſt celebrated of the Greeks. They derived their origin from the Hellenes, who were ſo called from Hellen, the ſon of Deucalion, and who formed a ſmall tribe in Theſſaly: and from Dorus, Æolus, and Ion, his more remote deſcendants, the Hellenes were diſcriminated by the names of Dorians, Æolians, and Ionians. The name of the latter was gradually loſt in the more illuſtrious appellation of Athenians, ſettled in the leſs barren parts of Attica. (See ATTICA and ATHENS.) When the Heraclidæ took poſſeſſion of the Peloponneſus, 80 years after the taking of Troy, B.C. 1104, a ſignal revolution took place in ſeveral ſtates of Greece; and thoſe tribes, which occupied the iſlands and coaſts of Aſia Minor, were either expelled by their conquerors, or migrated to ſeek new ſettlements. The Æolians were the firſt of theſe emigrants, they croſſed the Helleſpont 88 years after the taking of Troy, B.C. 1096, and eſtabliſhed themſelves in the country, afterwards called Æolis or Æolia. According to Blair's tables their migration took place before the return of the Heraclidæ, in the year B.C. 1124. (See ÆOLIS.) Upon the death of Codrus, B.C. 1070, the monarchical form of government was aboliſhed in Athens, and ſucceeded by the adminiſtration of Archons. Diſſatisfied probably with this change, Neleus and Androclus, younger ſons of Codrus, determined to leave their country. Accordingly being joined by many refugees, and Athenian citizens, who complained that Attica was too narrow and barren for maintaining the increaſing number of its inhabitants, ſailed to Aſia Minor, and, expelling the ancient inhabitants, ſeized the central and moſt beautiful portion of the Aſiatic coaſt. Their colonies were gradually diffuſed from the banks of the Hermus to the promontory of Poſideion. They afterwards took poſſeſſion of Chios and Samos; and all theſe countries were united by the common name of Ionia, to denote that the Ionians compoſed the moſt numerous diviſion of the colony. The Ionic migration is fixed in Blair's tables at the year B.C. 1044, 60 years after the return of the Heraclidæ; but others refer it to the year B.C. 1055. The laſt tribe which emigrated was that of the Dorians, who, in the year B. C. 944, ſailed to the iſlands of Rhodes and Crete, already peopled by Doric tribes; while others tranſported themſelves to the peninſula of Caria, which, in honour of their mother country, received the name of Doris. (See DORIS.) In conſequence of this eſtabliſhment, which was formed 240 years after the Trojan war, the weſtern coaſt of Aſia Minor was planted by the Æolians in the north, the Ionians in the middle, and the Dorians in the ſouth. The Ionians, in particular, ſettled in a country of great extent and fertility, enjoying the moſt delicious climate, and peculiarly adapted to a commercial intercourſe with the moſt improved nations of antiquity. Thus favoured, they ſilently flouriſhed in peace and proſperity, till their growing numbers and wealth excited the avarice or jealouſy of the powers of Aſia. They were ſucceſſively conquered by the Lydians and Perſians, but never thoroughly ſubdued. "Having imbibed," ſays Dr. Gillies (Hiſt. of Anc. Greece, vol. 1. chap. 3.) "the principles of European liberty, they ſpurned the yoke of Aſiatic bondage. In their glorious ſtruggles to reaſſume the character of freemen, they ſolicited and obtained the aſſiſtance of their Athenian anceſtors, and occaſioned that memorable rivalſhip between the Greeks and Perſians, which having laſted two centuries, ended in the deſtruction of the Perſian empire. In this illuſtrious conteſt, the firſt ſucceſſes of the Greeks againſt enemies far more powerful, and incomparably more numerous than themſelves, inſpired them with an enthuſiaſm of valour. Their exploits merited not only praiſe but wonder; and ſeemed fit ſubjects for that hiſtorical romance, which, in the progreſs of literature, naturally ſucceeds to epic poetry." In proceſs of time the Ionians, poſſeſſing the delightful country above-mentioned, together with the mouths of great rivers, having before them convenient and capacious harbours, and behind, the wealthy and populous nations of Aſia, whoſe commerce they enjoyed and engroſſed, attained ſuch early and rapid proficiency in the arts of navigation and traffic, as raiſed the cities of Miletus, Colophon, and Phocæa, to an extraordinary pitch of opulence and grandeur. Their population increaſing with their proſperity, they diffuſed new colonies every where around them. Having obtained footing in Egypt, in the eighth century before Chriſt, they acquired, and thenceforth preſerved, the excluſive commerce of that ancient and powerful kingdom. Their territories, though in their greateſt breadth compreſſed between the ſea and the dominions of Lydia to the extent of ſcarcely forty miles, became not only flouriſhing in peace, but formidable in war. With the utmoſt induſtry and perſeverance they improved and ennobled the uſeful or elegant arts, which they found already practiſed among the Phrygians and Lydians. They incorporated the muſic of thoſe nations with their own. Their poetry far excelled whatever Pagan antiquity could boaſt moſt precious. They rivalled the ſkill of their neighbours in moulding clay and caſting braſs. They appear to have been the firſt people who made ſtatues of marble. The Doric and Ionic orders of architecture perpetuate, in their names, the honour of their inventors. Painting was firſt reduced to rule, and practiſed with ſucceſs among the Greeks; and we may be aſſured, that, during the ſeventh century before Chriſt, the Ionians ſurpaſſed all their neighbours, and even the Phœnicians, in the arts of deſign, ſince the magnificent preſents which the far-famed oracle of Delphi received from the oſtentation or piety of the Lydian kings, were chiefly the productions of Ionian artiſts. In the following century Ionia gave birth to philoſophy; and both ſcience and taſte were diffuſed from that country over Greece, Italy, and Sicily. (Gillies, ubi ſupra.) The Ionians, however, ſoon degenerated from the valour of their anceſtors, and became a ſuperſtitious, effeminate, and voluptuous people, inſomuch that, in the time of Herodotus, they were looked upon as quite unfit for any military ſervice. They and the Greek colonies ſettled in Aſia, enjoyed their liberties, and lived, according to their own laws, from the time of their migration in the reign of Crœſus, king of Lydia, to whoſe ſuperior power they were forced to ſubmit, after having baffled all the attempts of his predeceſſors. Before Cyrus invaded Lower Aſia, he earneſtly intreated the Ionians (B. C. 547) to ſhare the glory of his arms; but having lived at eaſe under the mild government of Crœſus, they preferred their allegiance to him before the friendſhip of another unknown maſter. Accordingly they oppoſed him when he firſt invaded Lydia, and rejected the advantageous propoſals of that prince: but after the defeat of Crœſus they ſent ambaſſadors to the conqueror, offering ſubmiſſion upon the terms which had been formerly granted them by Crœſus. Cyrus having heard them with attention, anſwered them by the following apologue: "A piper ſeeing numerous ſhoals of fiſhes in the ſea, and imagining he might entice them aſhore by his muſic, began to play; but finding his hopes diſappointed, he threw a net into the water, and drew a great number to the land. When he ſaw the fiſh leaping on the ground, ſince you would not dance, ſaid he, to my pipe before, it is unneceſſary for you now to dance, ſince I have ceaſed to play." They now perceived that if they would eſcape the rigour of ſervitude, they muſt owe their ſafety to the ſtrenuous exertions of a brave defence, not to the clemency of Cyrus. The Lacedæmonians, to whom they applied, interpoſed in their behalf, and remonſtrated with Cyrus againſt his deſign of ſubduing the Aſiatic Greeks: but without effect. The Ionians had previouſly formed a powerful confederacy with the other ſtates. Cyrus, having ordered Crœſus into captivity, was eager to return towards the Eaſt to complete his conqueſts in Upper Aſia; and he committed the reduction of all the countries of Lower Aſia to the ſkill of his lieutenant, Harpagus (B. C. 539.) This general, in a few months, completely executed his commiſſion, and made himſelf maſter of all the countries in Lower Aſia, poſſeſſed by either Greeks or Barbarians. In the reign of Darius Hyſtaſpes, they made an attempt to recover their ancient liberty, and maintained a war againſt the whole power of the Perſian monarchy for ſix years: but they were conſtrained to ſubmit, and puniſhed with great ſeverity for their preſumption in endeavouring to regain their rights. The Ionians aſſiſted Xerxes in his expedition againſt Athens with 100 ſhips; but they were perſuaded by Themiſtocles to abandon the Perſians, and their flight contributed not a little to the famous victory gained by the Athenians at Salamis. A ſimilar expedient was recurred to at Mycale, ſo that few Perſians eſcaped ſlaughter. The Lacedæmonians were ſo pleaſed with their behaviour on this occaſion, that they propoſed to tranſplant them out of Aſia into Greece; but they declined accepting the propoſal. On the concluſion of the peace between the Greeks and Perſians, which happened in the reign of Artaxerxes, one of the articles ſworn to by both parties was, that all the Greek ſtates of Aſia ſhould be made free, and allowed to live according to their own laws. The Ionians, thus delivered from the Perſian yoke, formed an alliance with the Athenians; but were treated by them rather like ſubjects than allies. Their fortune was various; at one time ſubject to the Perſians, and at another time revolting from them, till they were at length delivered by Alexander, who reſtored all the Greeks in Aſia to the enjoyment of their ancient rights and privileges. After the death of Alexander, they fell under the power of the kings of Syria, till the Romans obliged Antiochus III. ſurnamed the Great, to grant the ſame liberty to the Greek colonies in Aſia, which they had procured for the Greek ſtates in Europe. On this occaſion, moſt of the free cities entered into an alliance with Rome, and enjoyed that kind of liberty which the Romans uſed to grant; till they were again brought under ſubjection by the famous Mithridates, king of Pontus, whom they joined againſt the Romans. By his order they maſſacred, without diſtinction, all the Romans and Italians whom trade, or the ſalubrity of the climate, had drawn into Aſia. Nor would they ſuffer even their famous temple of Diana to be an aſylum to thoſe who fled to it for refuge. Upon Sylla's arrival in Aſia they abandoned Mithridates, and declared for the Romans. Sylla, having routed all the armies of Mithridates, and reduced all the Leſſer Aſia, revenged on the Aſiatics the death of ſo many thouſand Romans, whom they had inhumanly murdered in compliance with the ſavage orders of Mithridates, by depriving them of their liberty, and laying ſuch heavy taxes and fines on their cities, as reduced them to beggary. The city of Epheſus was treated with the greateſt ſeverity; Sylla having ſuffered his ſoldiers to live there at diſcretion, and obliged the inhabitants to pay every officer 50 drachmas, and every ſoldier 16 denarii a-day. The whole ſum which the revolted cities of Aſia paid Sylla, amounted to 20,000 talents, that is, three millions eight hundred and ſeventy-five thouſand pounds ſterling; for the raiſing of which they were forced to ſell not only their moveables, but even a great part of their lands. This was a moſt fatal blow to Aſia; nor did the inhabitants ever after recover their ancient ſplendour, notwithſtanding the favour ſhewn them by many of the emperors, under whoſe protection they enjoyed ſome ſhew of liberty. Gillies's Hiſt. of Greece. Anc. Un. Hiſt. vol. vi.

IONIC Order, an order of *Architecture*, which owes its invention to the people of Ionia, and was firſt employed in the temple of Diana, at Epheſus. This order is an improvement upon the Doric; the column is more ſlender and graceful, and, according to Vitruvius, is intended to deſcribe the delicate proportions of the female figure, as the Doric indicates the ſtronger characteriſtics of the male. This idea, he ſays, is preſerved throughout its decorations: the capital having two ſpirals, peculiar to this order, on either ſide, in imitation of ringlets of hair projecting from the head; the cymatium indicates the locks hanging over the forehead; while the mouldings of the baſe repreſent the turn and ſhape of the ſhoes worn by women in the age when the order was invented. Its general appearance is ſimple, though graceful and majeſtic; and as forming a medium between the maſculine Doric and the virginal ſlenderneſs of the Corinthian; it has been, in figurative language, compared to a ſedate matron in decent, rather than in rich attire

This order may be uſed in all places conſecrated to peace and tranquillity; accordingly we meet with it in churches, colleges, and libraries; and the ancients uſed it in temples dedicated to Diana, Juno, Apollo, Fortune, Concord, &c. It may alſo be employed in palaces, halls of juſtice, and private houſes.

In erecting the temple at Epheſus, the bold characteriſtics of the original hut were omitted; and inſtead of the triglyphs and mutules of the Doric order, the more delicate dentils of the Ionic were ſubſtituted. The omiſſion of theſe large members obviates the difficulty experienced in the execution of the Doric in confined ſituations, particularly in internal angles.

The Ionic baſe, according to Vitruvius, conſiſts of a torus and two ſcotiæ, with aſtragals between them. In the Athenian Ionics, the baſe conſiſts of two tori, with a ſcotia or trochilus between them, and two fillets, each ſeparating the ſcotia from the torus above and below. The fillet above the torus generally projects as far as the extremity of the upper torus, and the lower fillet beyond it. The ſcotia is very flat, and its ſection forms an elliptic curve, joining the fillet on each ſide. The tori and ſcotia are nearly of equal heights. In the Ionic temple on the Illyſus, a bead and fillet are employed above the upper torus, joining the fillet to the ſcape of the column. In this temple, and in that of Erectheus, the upper torus is fluted, except the lower part, where it joins the upper ſurface of the fillet, which is preſerved entire. The baſes of the antæ of the latter temple are alſo receſſed. In the temple of Minerva Polias, the upper ſcotia is enriched with a guilloche, and the baſes of the antæ are ſtriated, the flutes being ſeparated from each other by two ſmall cylindric mouldings of a quadrantal ſection, which join each other at their convexities. This is the true Attic bow, it was invented by the Athenians, and is the moſt favourite baſe both with the ancients and moderns, being lighter in its upper part than the Ionic, more pleaſing in its contour, and elegant in its general appearance. The Romans did not confine the uſe of this baſe to their Ionics, but very frequently adopted it in the Corinthian and Compoſite orders. They, however, differed very much from the Greeks in the proportions they aſſigned to it; for they always make the upper torus of a leſs height than the lower one, have both tori plain, and give the ſcotia a much greater concavity. The baſes of the Ionic and Corinthian orders on the Coliſeum, the Ionic on the theatre of Marcellus, and the temple of Fortuna Virilis at Rome, have nearly the ſame proportions with thoſe deſcribed by Vitruvius. In the temples of Minerva Polias, at Priene, and of Apollo Didymæus, near Miletus, the Ionic baſes conſiſt of a large torus, three pair of aſtragals, ſeparated by two ſcotiæ inverted towards each other; the upper pair of aſtragals lying below the torus. In the former temple the torus is elliptical, and ſeparated from the ſhaft by the intervention of an aſtragal. The under part of this torus is alſo fluted, and there is a flute cut in the upper part near the bead. In the latter temple, the upper torus is plain, of a ſemi-circular ſection, with a narrow fillet between each bead of every pair. The baſe of the Aſiatic Ionics differ very little from that of Vitruvius, except that they have the ſcotiæ inverted towards each other, which gives a greater variety in the profile than when both ſtand in the ſame poſition. The Ionians alſo ſometimes uſed the Attic baſe, as may be ſeen in the temple of Bacchus, at Teos.

The Ionic ſhaft is ſometimes plain, but more frequently ſtriated into 24 flutes, with an equal number of fillets.

The volute is a diſtinguiſhing feature in this order, and is variouſly executed. In all the Athenian Ionics, and in the temple of Minerva Polias, at Priene, the lower edge of the canal between the volutes is formed into a graceful curve, bending downwards, and coiling round the ſpirals which form the volutes. The volutes of the capitals of the temples of Minerva Polias, and of Erectheus at Athens, exceed every other remain of antiquity for ſingularity and beauty: each volute has a double channel, formed by two diſtinct ſpiral borders, which leave between them a deep receſs or groove, diminiſhing gradually in its breadth till it is entirely loſt on the ſide of the eye. In the former temple, the ſhaft is terminated with a ſingle fillet below the lower edges of the volutes; and in the latter, with a fillet and aſtragal. In both, the Colorino is decorated with woodbines, formed alike in the alternate courſes, but differing in the adjoining ones. The upper annular moulding of the column is of a ſemi-circular ſection, embelliſhed with a guilloche. In the temple of Bacchus, at Teos, the great theatre at Laodicea, and in all the Roman Ionics, the connecting channel of the volutes has no border on the lower edge, but is terminated with a horizontal line, which falls a tangent to the beginning of the ſecond revolution of each volute. When columns are given to the flanks as well as the front of a building, the angular volute of the outſide column is double, and made to face both the contiguous ſides of the building; examples of which are to be met with in the temples of Fortuna Virilis at Rome, of Minerva Polias at Priene, of Bacchus at Teos, and of Erectheus, and the temple on the Illyſus, at Athens. Sometimes the capitals of all the columns are made to face the four ſides of the abacus alike, as in the temple of Concord at Rome, from which example the Scammozzian capital, as it is called, was firſt imitated by Michael Angelo, as may be ſeen in the Conſervatorium, embelliſhed by him with this capital during the pontificate of Paul III. before Scammozzi was known as an architect.

Both Grecian and Roman Ionic capitals have the echinus, aſtragal, and fillet. The echinus is uniformly cut into eggs, ſurrounded with borders, and tongues between every two borders. The aſtragal conſiſts of a row of beads, two large and two ſmall alternately. In all the Roman buildings, except the Coliſeum, theſe mouldings are cut alike, differing only in the taſte of the foliage.

In the temple of the Illyſus, the architrave conſiſts of one broad facia, crowned with a cymatium. The parts of the cornice viſible in front are the corona, with its cymatium and ſima. The cymatium of the frieze is wrought under the cornice, and conſiſts of a ſima reverſa, and bead below it. The height of the architrave is about two-fifths of the entablature; and by dividing the upper three-fifths into five other parts, the plain part of the frieze will be found to occupy three, and the cornice two parts. The architraves of the temples of Erectheus and Minerva Polias at Athens, conſiſt of three faciæ and cymatium; the cymatium of the frieze being moſtly wrought under the corona. Divide the height of the entablature, from the bottom of the lower facia to the top of the cymatium of the corona, into 19 parts, and the architrave, with the part of the frieze that is ſeen, will be found to occupy 16, *viz.* eight for the architrave, and as many for the frieze; the other three parts will compriſe the corona, including the larmer and cymatium.

In general, the height of the entablature may be two diameters; but in buildings requiring grandeur as well as elegance, it ſhould not be leſs than a fourth.

The Aſiatic Ionic differs materially from the European or Attic. In the former, moſt of the remains are without the friezes, ſo that the height of the entablatures cannot be preciſely determined, notwithſtanding that the architraves and cornices have been accurately meaſured. In the great theatre at Laodicea, however, this order has a pulvinated frieze, whoſe height is rather leſs than a fifth of that of the whole entablature. In the temples of Bacchus at Teos, and of Minerva Polias at Priene, the architraves are divided into three faciæ below the cymatium. In all the Aſiatic ſpecimens, the crowning moulding is a ſima recta, leſs in projection than in height; the dentils are conſtantly uſed, and their height is about a mean proportion between that of the ſima recta and that of the larimer; it being always greater than the height of the larimer, and leſs than that of the ſima recta. The cymatium of the denticulated band being wrought almoſt entirely out of the ſoffit of the corona, receſſed upwards, its elevation is almoſt concealed from the eye of the beholder. The height of the cornice, from the top of the ſima, to the lower edge of the dentils, is about equal to that of the architrave. The altitude of the frieze, excluſive of its cymatium, or upper mouldings, may be taken at about a fourth of the whole entablature. To give it a greater proportion, would make the entablature too high for the columns.

In the Ionic examples of Greece, there is a conſtant ratio between the upper part of the cornice, from the lower edge of the corona upwards, and the height of the entablature, which is nearly as two to nine. This is a very diſtinct diviſion, occaſioned by the great receſs of the mouldings under the corona; for which reaſon the cornice is not reckoned too clumſy, though the whole denticulated band and cymatium of the frieze be introduced below it; and this ſeems to be the characteriſtic difference between the European and Aſiatic Ionics. This order, as found in Ionia, is complete; while the ſpecimens of Attica want the dentil band, though in other reſpects they are very beautiful. But the moſt exquiſite remains we have of this order, are to be found in the temple of Minerva Polias at Priene, which, for beauty of proportion and elegance of decoration, exceeds every other ſpecimen.

Plate XXVIII. exhibits a repreſentation with the proportions of this magnificent example, the proportions being marked upon the outline.

Plate I. exhibits in *figs.* 1, 2, 4, 5, different baſes applicable to the Ionic orders, *fig.* 1. from the temple of Jupiter Olympius; *fig.* 2. from that of Minerva Polias, at Athens; *fig.* 4. an Ionic baſe according to Vignola; *fig.* 5, elevation of the capital of the temple of Minerva Polias, at Athens. This is perhaps the moſt elegant ſpecimen that is to be found of the Ionic capital.

IONIC *Architrave, baſe, capital, corniche, entablature, freeze, pedeſtal.* See the ſubſtantives.

IONIC *Dialect,* in *Grammar,* a manner of ſpeaking peculiar to the people of Ionia.

At firſt, it was the ſame with the ancient Attic; but paſſing into Aſia, it did not arrive at that delicacy and perfection to which the Athenians attained; inſtead of that it rather degenerated in Aſia Minor; being corrupted by the admiſſion of foreign idioms.

In this dialect it was that Herodotus, Hippocrates, and Galen wrote. See DIALECT.

IONIC *Sect* was the firſt of the ancient ſects of philoſophers, and was called the Ionic ſchool.

The founder of this ſect was Thales, (ſee his article,) who, being a native of Miletus, in Ionia, occaſioned his followers to aſſume the appellation of Ionic.

It was the diſtinguiſhing tenet of this ſect, that water was the principle of all natural things.

This is what Pindar alludes to in the beginning of his firſt Olympic Ode.

But Thales could not mean to aſſert, that water is the efficient cauſe of the formation of bodies; but merely, that this is the element from which they are produced. It is not improbable, that by "water," he meant to expreſs the ſame idea, which the Coſmogoniſts expreſſed by the word chaos, the notion annexed to which was that of a turbid and muddy maſs, from which all things were produced. (See CHAOS.) It has been much debated, whether Thales, beſides the paſſive principle in nature, which he called water, admitted an intelligent, efficient cauſe. Thoſe who have maintained the affirmative lay great ſtreſs upon ſundry aphoriſms concerning God, which are aſcribed by the ancients to this philoſopher, particularly the following; that God is the moſt ancient being, who has neither beginning nor end; that all things are full of God; and that the world is the beautiful work of God. They alſo allege the teſtimony of Cicero, who ſays, (De Nat. Deor. l. i. c. 10.) that Thales taught, that water is the firſt principle of all things, and that God is that mind which formed all things out of water. Thoſe who are of the contrary opinion, urge that the ancients, and even Cicero himſelf, though not very conſiſtently, aſcribe to Anaxagoras the honour of having firſt repreſented God as the intelligent cauſe of the univerſe, and they add that the evidence in favour of Thales reſts only upon traditional teſtimony, which may be oppoſed by other authorities. (Clem. Alex. Strom. l. ii. p. 364. Aug. de Ca. Dei. l. viii. c. 2. Euſeb. Prep. Evang. l. i. c. 7.) The truth may probably be this; that Thales, though he did not expreſsly maintain an independent mind as the efficient cauſe of nature, admitted the ancient doctrine concerning God, as the animating principle or ſoul of the world. Concerning the material world, Thales taught, that night exiſted before day, which doctrine he probably borrowed from the Grecian theogonies, which placed Night, or Chaos, among the firſt divinities. He held that ſtars are fiery bodies; that the moon is an opaque body illuminated by the ſun, and that the earth is a ſpherical body, placed in the middle of the univerſe. In mathematics, Thales is ſaid to have invented ſeveral fundamental propoſitions, which were afterwards incorporated into the elements of Euclid; particularly the following theorems, *viz.* that a circle is biſected by its diameter; that the angles at the baſe of an iſoſceles triangle are equal; that the vertical angles of two interſecting lines are equal; that, if two angles and one ſide of one triangle be equal to two angles and one ſide of another triangle, the remaining angles and ſides are reſpectively equal; and that the angle in a ſemicircle is a right angle. Of his knowledge of the principles of menſuration, and conſequently of the doctrine of proportion, his inſtructions to the Egyptian prieſts for finding the height of their pyramids, are a ſufficient proof. His method was this; at the termination of the ſhadow he erected a ſtaff perpendicular to the ſurface of the earth; and thus obtained two right-angled triangles, which enabled him to infer the ratio of the height of the pyramid to the length of its ſhadow, from the ratio of the height of the ſtaff to the length of its ſhadow. (Laert. l. i. § 24, 25. 27. Proclus in Euclid. l. i. Plin. Hiſt. Nat l. xxxviii. c. 17.) Aſtronomy, as well as mathematics, ſeems to have received conſiderable improvement from Thales. He was able to predict an eclipſe, though probably with no great degree of accuracy as to the time; for Herodotus, who relates this fact (l. i.), only ſays, that he foretold the year in which it would happen. He taught the Greeks the diviſion of the heavens into five zones, and the ſolſtitial and equinoctial points, and approached ſo near to the knowledge of the true length of the ſolar revolution, that he corrected their calendar, and made their year to contain 365 days. The ſeeds of natural ſcience, which had been ſown by Thales, the father of the Grecian philoſophy, were ſucceſsfully cheriſhed in their growth by Anaximander. He was followed in the Ionic ſchool by Anaximenes, Anaxagoras, Diogenes Apollionetes, and Archelaus of Miletus, who may be conſidered as the laſt preceptor in the original Ionic ſchool. See the ſeveral biographical articles. Socrates is commonly reckoned to have been the diſciple of Archelaus. He was himſelf the founder of a ſchool; for an account of which ſee Socrates and Socratic *ſchool.* The inferior ſects in the Ionic ſucceſſion were tne *Cyrenaic,* the *Megaric,* and the *Eliac* or *Eretriac.* Thoſe of higher celebrity were the *Academic* and the *Cynic,* from which latter aroſe the *Peripatetic* and the *Stoic,* which was the laſt branch of the Ionic ſchool. See each of theſe articles.

The Ionic philoſophy, notwithſtanding the celebrity of its firſt profeſſors, ſoon failed in the Grecian ſchools, and never afterwards recovered its ancient reputation and authority. This was owing to the ſuſpicion of impiety under which it lay in Athens, to the early growth of new branches from the Socratic ſtock, and to the riſe and ſpread of the Eleatic and Epicurean philoſophy. In later times, the univerſal prevalence of the Platonic and Ariſtotelian ſyſtems precluded every idea of reviving the phyſiology of the Ionic ſchool, till, in the 17th century, an attempt was made for this purpoſe by Berigard, but in a manner ſo circumſpect and covert, that this philoſopher was commonly ranked among the followers of Ariſtotle, and even ſuppoſed to be deeply tinctured with the impiety of his ſyſtem. Claud Berigard was born at Molena in Spain in the year 1592, and ſtudied firſt at Aix, then at Paris, and afterwards at Piſa, where, by the favour of the duke of Tuſcany, he was appointed profeſſor of mathematics and botany. His fame, which ſpread through Italy, induced the republic of Venice, in the year 1640, to appoint him, with a liberal ſtipend, profeſſor of philoſophy in Padua. Here he remained till his death in 1668. In the year 1632, he publiſhed, under a fictitious name, a work entitled "Dubitationes in Dialogos Galilæi de Terræ Immobilitate;" but his principal work is his "Circuli Piſani," in which he relates the diſputations which were held at Piſa, on the phyſical writings of Ariſtotle, and gives his own ſentiments upon them. Berigard, having perceived the folly of that implicit obedience which had been long paid to the authority of the ſtagyrite, became a determined opponent of his philoſophy, not openly, which would have been hazardous, but in the indirect and concealed method of dialogue. Adopting the Ionic ſyſtem, he framed a diſputation between the Ariſtotelians and Ionics, in which he made Ariſtæus refute the reaſoning of Charileus, and ſupport the doctrine of the Ionic ſchool, by an appeal to experience, as well as by many ingenious arguments. However he ſaw, and confeſſed, that both the Peripatetic and Ionic ſyſtems were materially defective, and in many particulars erroneous; and therefore much inclined to philoſophical ſcepticiſm. Neverthleſs he endeavoured to prove, that the followers of Thales approached nearer to truth than thoſe of Ariſtotle, the dangerous tendency of whoſe tenets, in ſeveral particulars, he clearly expoſed. Among the doctrines of the ſtagyrite, thoſe which he chiefly reprobated were the following, *viz.* that the world is eternal; that the reſidence of the firſt mover is confined to the outer ſphere of the univerſe; that neither the world, nor any being, can properly be ſaid to have been created; and that there is one ſoul common to the whole human ſpecies. In oppoſition to theſe opinions, which Berigard rejected as capital errors, from which many others muſt ariſe, he maintained the Ionic doctrine of the eternity of the primary particles of matter; of a forming and preſiding mind, by whoſe agency theſe particles were collected into diſtinct bodies; and of the combination and diſperſion of theſe as conſtituting the formation and diſſolution of all things. In ſhort, Berigard ſeems to have prepared the way for the revival of the Atomic ſyſtem of Epicurus, which was, ſoon after this time, reſtored and defended by Gaſſendi. Brucker's Hiſt. of Philoſ. by Enfield. Bayle.

Ionic *Tranſmigration* was heretofore a celebrated epocha, which took its riſe from the retreat of the Athenian colonies; who, upon the death of Codrus, put themſelves under the command of his ſon Neleus, and eſtabliſhed the twelve cities of Ionia in Aſia.

Thoſe colonies, according to Eratoſthenes, were eſtabliſhed fifty years after the return of the Heraclidæ; and, according to Marſham, ſeventy-ſeven years after the taking of Troy. See Ionia.

Ionic, or Ionian *Mode,* in the *Ancient Greek Muſic.* The Ionian mode, reckoning from the grave to the acute, was the ſecond of the five middle modes in the Grecian ſyſtem. This mode was alſo called *Jaſtian,* and Euclid ſtill terms it the *grave Phrygian mode.* See Mode.

IONIS, in *Surgery,* a carbuncle of a violet colour.

JONKAKONDA, in *Geography,* a town of Africa, in the kingdom of Yani, on the N. ſide of the Gambia. N. lat. 13° 37′. W. long. 13° 50′.

JONKIOPING, a town of Sweden, in the province of Smaland, beautifully ſituated between two ſmall lakes, at the ſouthern extremity of the Wetter lake; it is the capital of the province, and the ſeat of the parliament or ſuperior court of juſtice for the kingdom of Gothland. The town is two miles in circumference, and contains 3000 inhabitants; the houſes are moſtly of wood, covered with turf. This town contains two fauxbourgs, three churches, an arſenal, and a manufacture of arms; 156 miles S.W. of Stockholm. N. lat. 57° 45′. E. long. 13° 59′.

JONKS, or Jonques, in *Ship Building,* veſſels very common in the Eaſt Indies, about the bigneſs of our fly-boats, but differing in form of building, according to the various methods of the nations in thoſe parts. See Junk.

JONOOL, in *Geography,* a town on the N.W. coaſt of the iſland of Timor. S. lat. 8° 59′. E. long. 125° 13′.

JONQUETIA, in *Botany,* was ſo called after Denis Jonquet, who, in the year 1665, publiſhed the *Hortus Regius Pariſinus,* in folio. This catalogue contains about 4000 plants, of which indeed the greater part are only varieties; but amongſt them are many Canadian and Alpine plants.— Schreb. 308. Willd. Sp. Pl. v. 2. 750. Mart. Mill. Dict. v. 2. (Tapirira; Aubl. Guian. v. 1. 470.—Tapiria, Juſſ. 372.) Claſs and order, *Decandria Pentagynia.* Nat. Ord. *Terebintaceæ,* Juſſ.

Gen. Ch. *Cal.* Perianth of five, roundiſh, deciduous leaves. *Cor.* Petals five, roundiſh, concave, ſpreading, longer than the calyx. *Stam.* Filaments ten, ſhorter than the corolla, affixed to a gland; anthers roundiſh. *Piſt.* Germen five-ſided, ſurrounded by a glandule; ſtyles none; ſtigmas five. *Peric.* Capſule ſomewhat globular, roundiſh, five-fruited, of one cell and five valves. *Seeds* five, ovate, arillated, each affixed to the valves.

Eſſ. Ch. Calyx of five leaves. Petals five. Capſule ſubglobular, of one cell, five valves, and five arillated ſeeds.

1. J. *paniculata.* Willd. (J. guianenſis; Mart.—Tapirira guianenſis; Aubl. Guian. t. 188.)—A native of woods in Guiana, where it flowers in November, and brings forth fruit in April. It is there called Tapiriri.—This *tree* riſes to the height of fifty feet, has a ſmooth ruſſet *bark,* and a white uncompact *wood.* *Leaves* alternate, unequally pinnate; conſiſting of four or five pairs of ſmooth, thin,

entire, oval, pointed leaflets. *Flowers* ſmall, numerous, white, axillary, and terminating in large, wide, ſcattered panicles.

JONQUIL. See NARCISSUS.

JONSAC, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Lower Charente; nine miles S.S.E. of Pons. The place contains 2509, and the canton 11,941 inhabitants, on a territory of 187½ kiliometres, in 20 communes.

JONSBERG, a town of Sweden, in Eaſt Gothland, near the coaſt of the Baltic; 22 miles E. of Nordkioping.

JONSON, or JOHNSON, BENJAMIN, in *Biography*, an Engliſh poet, was born, in 1574, at Weſtminſter, about a month after his father's death. He was educated at Weſtminſter ſchool under the learned Camden, and had made great progreſs in his ſtudies, when his mother, who had married a bricklayer for a ſecond huſband, took him from ſchool to work under his father-in-law. From this employment he eſcaped, enliſted for a common ſoldier, and ſerved in the army, contending with the Spaniards in the Netherlands. On his return from a ſervice in which he had gained much reputation, he entered himſelf at St. John's college, Cambridge; but the ſtate of his finances obliged him ſoon to quit this reſidence. He next attempted the profeſſion of an actor on the ſtage, but his talents were but ill adapted to this buſineſs; and from the life of an actor he undertook the more arduous taſk of dramatic writing. He was patronized by the immortal Shakſpeare. The firſt piece which Jonſon printed was "Every Man in his Humour," acted in 1598; his ſucceſs in this effort led him to furniſh a play yearly, till his time was occupied by the compoſition of the maſques, &c. with which the acceſſion of king James was celebrated. In 1609, he produced his "Epicene, or Silent Woman," which is accounted the moſt perfect of his comedies; and in the following year "The Alchemiſt" was performed with great applauſe. So induſtrious had his Muſe been, that in 1616 he publiſhed a folio volume of his works, and in the ſame year he received a grant from the king of the ſalary of poet-laureat for life; the office being at that time occupied by another, but to the duties of which Jonſon ſucceeded in 1619. He continued to write for the court and ſtage, but, in 1629, one of his comedies was hiſſed off the ſtage. From this time he fell into neceſſitous circumſtances, owing as well to the negligence of his diſpoſition, as to his fondneſs for convivial ſociety. It has been aſſerted, that king Charles I. hearing of his diſtreſs, ſent him ten pounds, a preſent very unſuitable to the means of a great monarch, and which the poet received with an ill grace: the fact has, however, been doubted, becauſe in Jonſon's works is to be found an epigram, "To king Charles for an hundred pounds he ſent me in my ſickneſs, 1629." From this period the powers of his mind and body ſeemed to droop together, and his later productions are but mendicant poems addreſſed to different patrons. He died in 1637, at the age of ſixty-three. He was interred in Weſtminſter Abbey, and the inſcription "O rare Ben Jonſon" was placed over his grave. This ſhort ſentence ſhews in what eſtimation his talents had been held. He had indeed been regarded as at the head of Engliſh poetry, and was addreſſed by the wits with the reverential title of "Father Ben." The buſt that now marks his place in Weſtminſter Abbey, was put up by the ſecond earl of Oxford. The fame of Jonſon is principally founded upon his comedies, which were for a long time reckoned the moſt perfect in the Engliſh language: but they have gradually diſappeared from the ſtage. It is now generally admitted that his excellence was compriſed within narrow limits, and chiefly conſiſted in the preſervation of the unities and the ſkilful management of the plot, but he was defective in almoſt every thing which makes comedy pleaſant. "As a general poet, Jonſon is for the moſt part harſh, frigid, and tedious, perpetually in purſuit of ſome uncommon thought, which he wants taſte and genius to render ſtriking and agreeable." Biog. Brit.

JONTHLASPI, in *Botany*. See CLYPEOLA.

JONTHOS, ἴονθος, in *Medicine*, ſignifies ſmall inflamed tumours, or pimples, which occur in the face. It was tranſlated *varus* by the Latins, which term they alſo applied to the *acne* of the Greeks. The *ionthi*, or *vari*, according to Sauvages, "are thoſe ſmall, red, hard, and obſtinate tumours, which ſcarcely ever ſuppurate, do not itch, are not painful, and only appear in the face." He conſiders them as of the ſame nature with the *Gutta roſea*.

JOOD-BOODANG, in *Geography*, a town on the W. coaſt of the iſland of Celebes. S. lat. 1° 39′. E. long. 119° 21′.

JOODPOUR, a circar of Hindooſtan, being one of the three great principalities into which Rajpootana is divided. It was alſo named Marwar. In Acbar's diviſion of the empire, theſe principalities were claſſed as belonging to the ſoubah of Agimere, which is ſometimes called Marwar. This principality lies to the N.W., bordering angularly on the other two, *viz.* Oudipour and Jyenagur. The revenues are ſtated to have been, in 1759, 40 lacks of rupees. This, as well as Oudipour, is very mountainous, with a ſandy ſoil in the vallies. (See RAJPOOTANA.)—Alſo, a town in the above circar, in the country of Agimere; 85 miles W.S.W. of Agimere. N. lat. 26° 7′. E. long. 73° 48′.

JOOGDANPOUR, a town of Bengal; 16 miles N.W. of Kiſhenagur.

JOOGDYA, a town of Bengal; 70 miles S.E. of Dacca.

JOOKY, a town of Bengal; 14 miles N.E. of Boglipour.

JOOSTLAND, ST., a ſmall iſland of Holland, ſeparated from the iſland of Walcheren, by a narrow channel, and containing one village.

JOOTSI-SIMA, or JAOTSIMA, two ſmall iſlands of Japan, near the N. coaſt of Niphon. N. lat. 37° 56′. E. long. 137 50′.

IOPÆAN, among the ancients, an exclamation uſed on account of a victory, or ſome proſperous event. Hoffman thinks that *Io Pæan* is a contraction of the Hebrew *Jao*, from *Jehovah*, and פנה, *reſpexit*; and was the ſame with *Jehovah Penoch, i. e. Dominus reſpiciat in nos.* Something like this exclamation ſtill remains among the Symerones, a people of the Weſt Indies, who, on any joyful occaſion, frequently cry out *Yo Peko*.

JOPPA, in *Ancient Geography*, a town of Phœnicia, ſituated at the ſouthern extremity of the plain of Saron, on a high hill, which commanded a full proſpect of the ſea on one ſide, and of a fertile country on the other. It had the town of Jamnia on the S.; Cæſarea Paleſtina on the N.; and Rama, or Ramula, on the E.; and it is often mentioned both in the Old and New Teſtament. The Greeks and Phœnicians aſcribe to it a very high antiquity; and it is certain that it exiſted 500 years before the Chriſtian era, ſince Joſhua marks the limits of the tribe of Dan in the vicinity of Japho, the Phœnician name of this town. Joppa, which had a good port, and the only one that the Jews had on the Mediterranean, belonged ſucceſſively to the Chaldeans, Perſians, the Lagidæ of Egypt, and the Seleucidæ of Syria; and it was under the dominion of theſe laſt 163 years B.C. The inhabitants of this place provoked the indignation of Judas Macchabæus, by a violation of their treaties, and by precipitating 200 Jews into the ſea, which induced him to fall upon them by ſurpriſe in the night and to burn all their veſſels. Joppa underwent various revolutions until the arrival of Pompey in Syria, about 64 years before our era. This general reſtricted Judea within its ancient bounds, and obliged Hyrcanus to evacuate the towns of Phœnicia; but Auguſtus gave this town to Herod. In conſequence of the revolt of the Jews, Gallus-Ceſtius, governor of Syria, took it and ſet it on fire, A.D. 66. The Jews made ſeveral efforts to re-eſtabliſh it; but Veſpaſian, in the year 67, diſpatched a body of troops from Cæſarea, who took it without difficulty. The Jews betook themſelves for refuge to the ſea; but being beſet by a violent tempeſt, more than 4000 of them periſhed. The Romans again deſtroyed it. (Joſephus de Bell. Jud.) The town was ſo entirely ruined during the holy war, that it had ſcarcely any buildings left ſtanding but the old caſtle, ſituated on an eminence above it, and another near the ſea-ſide. The town was afterwards rebuilt towards the ſea with good ſtore-houſes; and is now called *Jaffa*, or *Yafa*, which ſee.

JOPPA, in *Geography*, a ſmall town of America, in Harford county, Maryland; 20 miles E. by N. of Baltimore.

JORBORG, a town of Samogitia, on the Niemen; 20 miles S. of Roſienne.

JORDAENS, JACOB, in *Biography*, a painter of hiſtory and portraits, poſſeſſed of very ſuperior abilities in his art, was born at Antwerp in 1594. He firſt ſtudied with Adam Van Oort, whoſe daughter he married at an early period of his life; but it was to Rubens he ſtood indebted for the principal part of his knowledge; though it is dubious whether he ever was admitted into the ſchool of that maſter. Certain it is, however, that he more forcibly carried into effect his principles than any of his diſciples, except Vandyke.

It is ſaid by Sandrart, that Rubens was jealous of him, and if ſo great a man were capable of that mean paſſion, certainly the talents of Jordaens might well excite it. He painted with almoſt incredible force and brilliancy. Neither Rubens nor Tintoretto, in that reſpect, excel him; his compoſitions are full of buſtle, and deſigned with great truth, even grandeur of form. His defect (and it muſt be allowed that it is a great one, in an art whoſe principal end is to adorn, to improve, to pleaſe mankind) is groſſneſs of ſubject and of form; not indecent, but vulgar, low common life.

His power to give rotundity and relief to his figures, is amazing; and his execution is of the moſt maſterly kind.

The French have poſſeſſed themſelves of many of his principal works; two are particularly noticeable in the gallery of the Louvre, the Flemiſh celebration of Twelfth night, known by the appellation of "Le Roi boit," and Chriſt driving the money-changers from the temple.

He was remarkable for the rapidity of his execution, and appears to have ſtudied his figures and effects by candle light, or in bright ſun-ſhine. Having obtained great renown and ſucceſs, he died in 1678.

JORDAN, in *Ancient Geography*, the chief river of Paleſtine, which had its ſource in the lake of Phiala, about 10 miles N. of that of Samachon; which origin of the river was aſcertained by Philip the tetrarch, who made the experiment of throwing ſome ſtraw or chaff into the lake, which came out at the Panion, or Paneas, where the river emerges out of the earth, after having run about 120 furlongs under ground. This lake Phiala, a name commonly given to all other reſervoirs of that kind, is ſituated in a moſt delightful country, ſo well adapted for commerce, that marts and fairs are held in the adjacent places through the ſummer by the neighbouring inhabitants. The etymology of the name has been variouſly aſſigned. Jordan, in Hebrew *Jarden*, is derived from *jerad, deſcendit*, or *jarden, deſcenſus*, from its rapid deſcent through that country. This origin is more probable than ſeveral others which have been given by different writers. Some ſay that it is formed of the oriental *Ior*, a ſtream, and *Dan*, a town, near which it had its ſource. Hardouin ſays that this name ſignifies the "river of delight," or the "delightful river." Others ſay, that *dan* or *dun* ſignifies depth, whence it was named the "deep river," to diſtinguiſh it from others in Paleſtine, all which were comparatively brooks or rivulets. The Arabs call it Arden or Harden, or Ordounon; the Perſians, Aerdun; and the Nubian geographer Edriſi gives it the name of Zacchar, which, in Arabic, ſignifies ſwelling or overflowing. Jordan is ſo conſiderable, in compariſon with others, that it is ſometimes ſtyled, by way of emphaſis, "the river." The courſe of the Jordan is moſtly ſouthward, bending a few degrees towards the weſt. After a run of about ten or twelve miles, it paſſes quite through the Samachonite lake, whence, after a courſe of about eighteen or twenty miles more, excluſive of its windings, it enters into the ſea of Tiberias on the N. ſide, and comes out again on the S. ſide, at a ſmall diſtance from a city of that name. Thence it proceeds ſtill ſouth-weſtward through a plain and deſert of about 60 miles, and falls into the Aſphaltite lake. Its courſe is very rapid, though its bed is deep. Pococke compares its breadth to that of the Thames at Windſor. Shaw gives it only 30 yards, whilſt he ſtates its depth, even at its brink, to be three yards. Its banks are occaſionally beautiful, and in ſome places covered with high and thick reeds, canes, and trees, ſuch as willows and tamariſks, which afford a convenient lodgment for lions and other wild beaſts. This river, it is ſaid, conſtantly overflowed its banks about the time of the early harveſt, or ſoon after Eaſter; and in this reſpect differed from other rivers, which commonly ſwell moſt during the winter. This inundation has been aſcribed to its ſubterraneous communication with the Nile. But it is more probably owing to the melting of the ſnows about that time, and the early rain which falls in great abundance. Modern travellers inform us, that it is no longer ſubject to theſe overflowings: becauſe, as they conceive, it has, by the rapidity of its current, worn its channel deeper than formerly, or, perhaps, diverted ſome of its waters another way. Its water is commonly very turbid, occaſioned by its rapidity; but it is ſaid to be very wholeſome and incorruptible: and ſuperſtition has even inveſted it with the property of waſhing away the ſins of mankind. Dr. Pococke, who mentions this circumſtance, adds, that not only men, but women, are ambitious of deriving benefit from theſe ſalutiferous waters, by bathing and ſwimming in it, even at the hazard of their lives. The Latin prieſts erect altars along its banks, where they ſay maſs to the devout pilgrims. We ſhall only add, that the plain on both ſides of this river, from the ſea of Tiberias to the Aſphaltite or Dead ſea, is very dry, ſultry, and inſalubrious during the heat of ſummer, and every where barren, except in that part which lies near the river, and is watered by it. Anc. Un. Hiſt. vol. ii.

JORDEN, EDWARD, M. D. in *Biography*, was born in the year 1569, at High Halden, in Kent, and probably educated at Hart-hall, Oxford. After completing his ſtudies in his own country, he travelled abroad, viſiting ſeveral foreign univerſities, and taking his degree of doctor in that of Padua. On his return, he practiſed for a time in London, where

where he became a member of the College of Phyſicians, and was in great reputation for learning and abilities. He gave an inſtance of his good ſenſe in detecting the impoſture of one Ann Gunter, who was affected with ſtrange and ſingular ſymptoms, which were imputed to witchcraft. Dr. Jorden removed, after ſome time, from London to Bath, where he ſpent all the latter part of his life, univerſally reſpected as well in his private character as in his medical capacity. The ſtudious and ſedentary life which he led, aggravating the diſorders to which he was conſtitutionally ſubject, the gout and ſtone, he died in his ſixty-third year, on January 7th, 1632. He was author of two publications: "A brief Diſcourſe of a Diſeaſe called the Suffocation of the Mother, &c." Lond. 1603; and 2. "A Diſcourſe of Natural Baths and Mineral Waters;" Lond. 1631, 4to. This ſoon went through a ſecond edition, and was afterwards reprinted in 1669, in 8vo., by Dr. Guidott, and again in 1673. It is a work of conſiderable learning and ingenuity, written in a clear ſtyle and judicious method. Aikin's Biog. Mem. of Med.

JORE, in *Geography*, the higheſt mountain in the Cherokee country, through which the Teneſſee river forces its waters.

JORGA, a town of Aſiatic Georgia, in the province of Kaket; 85 miles S.E. of Teflis.

JORGE Grego, a ſmall iſland near the coaſt of Braſil.

Jorge, *St.*, a town of Braſil, in the government of St. Salvador, and chief place of the capitaincy of Illicos, ſituated on land projecting into the Atlantic. S. lat. 14° 45′. W. long. 22° 40′.—Alſo, a town of New Mexico, on the Bravo; 20 miles E. of Sumas.

Jorge *de Olancho*, *St.*, a town of Mexico, in the province of Honduras; 100 miles E. of Valladolid. N. lat. 14° 35′. W. long. 86° 36′.

JORGEN, a town of Norway, in the dioceſe of Bergen; 33 miles S.W. of Romſdal.

Jorgen, *St.*, a town of the duchy of Stiria; 14 miles S.S.E. of Gratz.—Alſo, a town of Auſtria; 12 miles S.E. of Ips.—Alſo, a town of the duchy of Bremen; 8 miles N.N.E. of Bremen.

JORGENAW, a town of Pruſſia, in the circle of Natangen; 22 miles S.S.E. of Konigſberg.

JORGENBURG, a town of Auſtria; 14 miles S.S.W. of Steyr.

JORGENTAL, a town of Pruſſia, in the province of Oberland; 6 miles S.W. of Leibſtadt.

JORGENTHAL, a town of Bohemia, in the circle of Leitmeritz; 6 miles N.E. of Kamnitz.

JORJAN, or Corcan, a town of Perſia, and capital of a diſtrict, to which it gives name, in the weſtern part of Choraſan, bordering on the Caſpian ſea, ſituated on the Abiſcoun. It was anciently the capital of Hyrcania, and named Syringes; 300 miles N. of Iſpahan. N. lat. 36° 54′. E. long 54° 54′.

JORKOW, a town of Bohemia, in the circle of Saatz; 13 miles N. of Saatz. N. lat. 50° 28′. E. long. 13° 26′.

JOROPOUR, a town of Bengal; 38 miles N.N.E. of Calcutta.

JORQUERA, a town of Spain, in New Caſtile, on the Xucar; 38 miles S.S.E. of Alarçon.

JORRACH, a town of Arabia, in the province of Hedſjas; 188 miles S.S.E. of Mecca.

JORSA, one of the ſmaller weſtern iſlands of Scotland, between Scarba and Kerrera.

JORTIN, John, in *Biography*, born in London in 1698, was ſon of Renatus Jortin, a native of Bretagne, in France, who came over as a refugee on the repeal of the edict of Nantes, and who was appointed one of the gentlemen of the privy-chamber to king William III. in 1691. He was afterwards ſecretary to admiral Ruſſel, earl of Orford, and ſir Cloudeſley Shovel, and periſhed with the latter when his ſhip ſtruck on the rocks of Scilly. This was in October 1707, when his ſon John, only nine years of age, was ſent to the Charter-houſe as a day-ſcholar, where he laid the foundation of an exact and elegant claſſical taſte. In 1715 he was admitted penſioner of Jeſus college, Cambridge, and ſo diſtinguiſhed himſelf by his talents and application, that, while he was under-graduate, he was engaged, by the recommendation of Dr. Thirlby, to tranſlate ſome of Euſtathius's notes on Homer for Mr. Pope. He performed the work to the ſatisfaction of the poet, who, however, did not think it worth while to make any perſonal enquiry after a young ſtudent at college. "I was," ſays Mr. Jortin, "in ſome hopes, in thoſe days (for I was young), that Mr. Pope would make enquiry about his coadjutor, and take ſome civil notice of him. But he did not, and I had no notion of obtruding myſelf upon him—I never ſaw his face." Mr. Jortin was admitted to the degree of bachelor of arts in January 1718-19, and was elected fellow of Jeſus college in October, 1721, and in the following year he took his degree of M. A. In this latter year he was appointed one of the moderators at the diſputations, and appeared likewiſe as a writer, by the publication of his "Luſus Poetici," a collection of Latin poems, which have been ranked among the moſt elegant and truly claſſical compoſitions of the kind produced by a modern ſcholar. They have been frequently reprinted, and retain their original reputation. He was admitted to prieſt's orders in 1724, and in 1727 was preſented by his college to the vicarage of Swaveſey, near Cambridge. In 1730-1, he reſigned his vicarage, and ſettled in London, where he ſerved a chapel belonging to St. Giles in the Fields, in New-ſtreet, Bloomſbury, about ſixteen years. His firſt publication, after his arrival in the metropolis, conſiſted of four ſermons on the truth of Chriſtianity, which have ſince been incorporated in ſome of his ſubſequent publications. In the years 1731 and 1732, Mr. Jortin, in conjunction with biſhop Pearſe, Dr. Taylor, Mr. Upton, Dr. Thirlby, and others, publiſhed, in a ſeries of twenty-four ſix-penny numbers, "Miſcellaneous Obſervations upon Authors, ancient and modern," which were highly applauded by the learned of his own country, and which were tranſlated into the Latin language at Amſterdam. He next publiſhed "Remarks on Spenſer's Poems," to which were ſubjoined "Remarks on Milton:" he publiſhed likewiſe "Remarks on Seneca." In 1747 he was appointed by his friend Dr. Pearſe, then rector of St. Martin in the Fields, to be afternoon preacher at a chapel in Oxendon-ſtreet. In 1749, Mr. Jortin, at the recommendation of archbiſhop Herring and biſhop Sherlock, was appointed preacher of Boyle's lecture. The ſubſtance of the diſcourſes which he delivered on this occaſion, was afterwards inſerted in his "Remarks upon Eccleſiaſtical Hiſtory." Of this work, the firſt volume was publiſhed in 1751, and the ſecond and third in the years 1752 and 1754, the other volumes were given to the world after the author's death. In 1751, he had been preſented by archbiſhop Herring with the rectory of St. Dunſtan in the Eaſt; and in the year 1755 he was preſented by the ſame prelate with a Lambeth degree of D. D. The principal work of Dr. Jortin was his "Life of Eraſmus," of which the firſt part was publiſhed in 1758, in one volume 4to.; the ſecond volume, printed in 1760, conſiſted only of obſervations on the writings of Eraſmus. The groundwork of this piece of biography, is one drawn up by the celebrated Le Clerc, and publiſhed in his "Bibliotheque

Choiſie:" "The life of Eraſmus," ſays Dr. Knox, "abound with matter intereſting to the ſcholar; but the ſtyle and method are ſuch as will not pleaſe every reader. There is a careleſsneſs in it, and a want of dignity and delicacy." Nevertheleſs it extended the reputation of Dr. Jortin beyond the limits of his native country, and eſtabliſhed his literary character in the remoteſt univerſities of Europe. The declining years of Dr. Jortin were cheered by ſome ſubſtantial proofs of the eſteem which he had inſpired for his character and abilities. In 1762, he was collated by biſhop Oſbaldiſton to a prebend in the cathedral of St. Paul's, and in the ſame year he was preſented by the ſame friend to the valuable vicarage of Kenſington. The biſhop, as another proof of his determined patronage of our author, appointed him archdeacon of London, in April 1764, and it is believed he offered him the rectory of St. James, Weſtminſter, upon the death of Dr. Samuel Nicolls, in November 1763, but he choſe to continue at Kenſington, that being a ſituation better adapted to his advanced age. Dr. Jortin died on the 5th of Sept. 1770, in the 72d year of his age. The tranquil compoſure of his laſt moments was expreſſed in the words he ſpoke to his nurſe, who urged him to take more nouriſhment: "No," ſaid he, "I have had enough of every thing." He left a widow and two children. The private character of Dr. Jortin was truly eſtimable: he had a ſpirit which raiſed him above every thing mean and illiberal, and would not permit him to ſtoop for preferment. His manners were ſimple, and in ſome reſpects ruſtic: he had true urbanity in his temper, and benevolence in his heart. As a public defender of religion, he is claſſed by biſhop Watſon among thoſe great and eminent names who have honourably and ſucceſsfully laboured to eſtabliſh the truth and illuſtrate the doctrines of Chriſtianity. Dr. Knox, ſpeaking of his "Diſcourſes on the Chriſtian Religion," which was one of the firſt fruits of his theological purſuits, ſays they abound with ſound ſenſe and ſolid argument, which entitled their author to a rank very near the celebrated Grotius. He farther adds, "as a poet, a philoſopher, and a man, he ſerved the cauſe of religion, learning, and morality." Beſides the works already noticed, Dr. Jortin was author of an "Eſſay on Muſical Expreſſion:" of "Six Diſſertations on different Subjects;" and after his death his "Sermons and Charges," in ſeven volumes, were given to the world. His works were publiſhed a few years ſince in an uniform manner, and may be had with or without the life of Eraſmus. Of theſe works a full account will be found in the "Memoirs of the Life and Writings of Dr. Jortin," by the Rev. Dr. John Diſney, who has alſo given the character of the author as drawn by the energetic pen of Dr. Parr. "Jortin," ſays he, "whether I look back to his verſe, to his proſe, to his critical, or to his theological works, there are few authors to whom I am ſo much indebted for rational entertainment, or for ſolid inſtruction. Learned he was, without pedantry. He was ingenious without the affectation of ſingularity. He was a lover of truth, without hovering over the gloomy abyſs of ſcepticiſm, and a friend to free inquiry, without roving into the dreary and pathleſs wilds of latitudinarianiſm. He had a heart which never diſgraced the powers of his underſtanding. With a lively imagination, an elegant taſte, and a judgment moſt maſculine, and moſt correct, he united the artleſs and amiable negligence of a ſchool-boy. Wit without ill nature, and ſenſe without effort, he could at will ſcatter upon every ſubject, and in every book the writer preſents us with a near and diſtinct view of the real man."

JORVIS, in *Geography*, a town of Sweden, in the government of Kuopio; 43 miles S. of Kuopio.

IOS, in *Ancient Geography*, one of the Cyclades iſlands, E.N.E. of the iſland Sicinos, N.N.W. of Thera, and S.S.W. of Nayos. This iſland derived its name from a colony of Ionians, who were its firſt inhabitants. It is famous only for being the place of Homer's death and burial. It is ſaid that the town of Argos was accuſtomed to ſend every five years a deputation to this iſland, commiſſioned to offer libations in its name on the tomb of the poet, which was an object of public veneration.

JOSEF, St., in *Geography*, a town of California, where the Manila ſhip generally took in water on its voyage to Acapulco; 45 miles S. of Loreto. N. lat. 23° 4'. W. long. 109° 48'.—Alſo, a town of the iſland of Cuba; 125 miles W.S.W. of Havanna.—Alſo, a town of South America, in the province of Chiquitas.—Alſo, a town of South America, in the province of Moxes.—Alſo, a ſmall iſland in the Atlantic, near the coaſt of Patagonia. S. lat. 44° 30'.—Alſo, a town of New Mexico, in the province of Sonora; 35 miles S. of Pitquin.—Alſo, a town of New Mexico, on the Bravo; 27 miles N.W. of Santa-Fé.—Alſo, a town of South America, in the government of Buenos Ayres; 185 miles E. of Corientes.—Alſo, a ſmall iſland in the bay of Los Camarones, near the coaſt of Patagonia. S. lat. 44° 30'.—Alſo, a town and fort of South America, in the province of Tucumar; 90 miles S.S.E. of Salta.—Alſo, a town of South America, in the government of Buenos Ayres, and province of Moxes; 80 miles S.W. of Trinidad.

Josef *de Chiquitas, St.*, a town of South America, in the government of Buenos Ayres; 36 miles N.W. of Santa Cruz de la Sierra la Nueva.

Josef *de Huales, St.*, a town of South America, in the audience of Quito, on the Napo; 220 miles E.S.E. of Quito. S. lat. 1° 50'. W. long. 74° 26'.

JOSEFGROD, a town of Ruſſian Poland, in the palatinate of Braclaw, ſituated on a river which runs into the Bog; 76 miles S.S.E. of Braclaw.

JOSEPH, in *Scripture Biography*, a Hebrew patriarch, who ſuſtained a rank and character that entitle him to particular notice. He was the ſon of Jacob by his wife Rachel, and born about the year 1745 B.C. As he was the favourite of his father, on account of his perſonal and mental endowments, he became the object of the jealouſy and hatred of his brethren; and they ſold him to ſome Iſhmaelites who were travelling to Egypt (B.C. 1728), feigning a tale that he had been devoured by wild beaſts. When the Iſhmaelites arrived in Egypt, thay ſold Joſeph to Potiphar, an officer of the royal houſhold. In this ſituation Joſeph conducted himſelf with ſuch prudence, induſtry, and fidelity, that his maſter committed all his affairs to his management. After ten years ſervice Potiphar's wife aſſailed him with a temptation, which every principle of gratitude and honour, as well as of religion, induced him to reſiſt; but the conſequence of his integrity was her reſentment, and a reſolution, as far as ſhe could prevail, to effect his ruin. Accordingly ſhe formed an artful ſtory, intimating that Joſeph had made an attempt upon her virtue; and ſhe contrived to impoſe upon her huſband Potiphar, and to procure Joſeph's commitment to priſon. The patriarch's conduct, during his impriſonment, engaged confidence, and he was entruſted with the care of his fellow-priſoners. Among theſe were two perſons of ſome diſtinction, who had belonged to Pharaoh's houſhold. Both of them had dreams in the ſame night, which they communicated to Joſeph, and which he undertook to interpret. One of them was to be reſtored to his office, and the other was to be hanged; and the events correſponded to his predictions. Upon the future advancement of one of theſe perſons, who was the chief butler, the other being the chief baker, he was altogether unmindful of Joſeph, and made no effort, notwithſtanding his application to him, to procure for him his liberty. In proceſs of time Pharaoh had two dreams, by which his mind was much impreſſed, and which none of the wiſe men who belonged to his court were able to interpret. The chief butler was thus reminded of Joſeph, and acknowledging to the king his ingratitude for neglecting him, related the circumſtances pertaining to himſelf and the chief baker. Upon this information, Pharaoh ordered Joſeph to be brought to him. The king imparted to him his dreams; and Joſeph, modeſtly diſclaiming all pretenſions to ſuperior wiſdom, and relying on that divine ſuggeſtion with which he hoped to be favoured, interpreted them to his ſatisfaction. (B.C. 1715.) Theſe dreams and their interpretation it is unneceſſary for us minutely to recite. It is ſufficient to obſerve, that the king was then forwarned of ſeven years of fertility and abundance, which were to be ſucceeded by the ſame period of ſterility and famine; and he found it neceſſary to make previous proviſion accordingly. With this view Joſeph, who was near thirty years of age, was appointed general ſuperintendant of the affairs of the kingdom, and inveſted with authority next to that of Pharaoh himſelf, who alſo gave him in marriage the daughter of Potipherah, prieſt of On. The courſe of events was preciſely ſuch as Joſeph had pre-ſignified by his interpretation of Pharaoh's dreams; ſo that granaries were eſtabliſhed under his direction in the cities of Egypt, and corn collected in great quantities, and laid up in ſtore, during the years of plenty, for the ſupply, not only of Egypt, but of neighbouring countries in the ſucceeding years of ſcarcity. The years of famine began B.C. 1708. In this period of general diſtreſs Jacob ſent 10 of his ſons, from Canaan to Egypt, in order to purchaſe corn. As this buſineſs was wholly committed to the management of Joſeph, they were referred to him. Joſeph inſtantly recognized their perſons, though he was unknown to them; but in order the more effectually to prevent their diſcovery of him, and, probably, to excite in their minds a due ſenſe of their paſt crime, he queſtioned them in an angry tone, and by an interpreter, concerning their country; and being informed that they had come from the land of Canaan, charged them with being ſpies, which charge they obviated by giving a true account of their father and family. A younger brother, they ſaid, was left at home with his father, and another was now no more. Joſeph ſtill perſiſted in the charge, and required their verifying the account which they had given of themſelves, by diſpatching one of their number to fetch their younger brother, while the reſt remained in cuſtody. However, he afterwards relented, and propoſed that one of them ſhould remain till the arrival of the younger brother, and that all the reſt ſhould go home with corn for their families. During their detention they accuſed one another for the cruelty of their conduct towards Joſeph, who, ſtill feigning himſelf a ſtranger to their language, heard their mutual reproaches with an emotion which he could not ſuppreſs, and which, therefore, required his withdrawing from them. At length he gave them leave to depart, informing them, that if their account of themſelves was true, they would be permitted to traffic in the land. Simeon, who is ſuppoſed to have been the principal aggreſſor in the treatment of Joſeph, was kept in cuſtody; and the others were diſmiſſed. Before their departure orders had been given that when the ſacks were filled with corn, each man's money ſhould be returned in his ſack's mouth. This circumſtance, when it was diſcovered in their journey homewards, very much alarmed them; and they concluded that this was done in order to furniſh a pretence for enſlaving them when they next viſited Egypt. Jacob heard their adventures with ſurpriſe and concern; more eſpecially when he found that Simeon was left behind in cuſtody, and that they were pledged to take Benjamin with them before they could obtain his releaſe. At length, as the ſcarcity increaſed, and their ſupply was nearly exhauſted, Jacob, with great reluctance, conſented to part with Benjamin; and having ordered them to provide preſents for the ruler of Egypt, and to carry with them twice as much money as before, he committed them to the bleſſing of heaven, and diſmiſſed them. Upon their arrival in Egypt, they haſtened to preſent themſelves before Joſeph; and were kindly received and liberally entertained at a public dinner which he had provided for them. Some circumſtances occurred on this occaſion which might have brought their brother to their recollection; but they again departed with their ſacks and money as before, and in Benjamin's ſack was the ſilver cup out of which Joſeph himſelf drank. Upon their return towards Canaan they were followed by an officer, who charged them with ingratitude for the hoſpitality with which they had been treated, and with the theft of his lord's ſilver cup. All of them proteſted their innocence; but upon ſearching the ſacks, the cup was found to their great ſurpriſe and concern in that of Benjamin. They were therefore taken back to Joſeph, who inſiſted upon detaining Benjamin as a ſlave, whilſt they might be allowed to return home in peace. Recollecting the reluctance with which his father had parted with his ſon Benjamin, and that they were ſureties for his return, they urged various pleas for his being allowed to accompany them. Judah was the advocate for his brother's liberty; and he offered himſelf as a ſubſtitute if he were permitted to return. Joſeph was at length overcome; diſguiſe became intolerably irkſome to him; and he could no longer refrain from diſcovering himſelf to his brethren. (B.C. 1706.) This part of the ſacred hiſtory is wrought up with incomparable beauty and pathos, and muſt ſuffer by any attempt to abridge it, or to relate it in different language. The diſcovery being made, they were all received, and particularly Benjamin, his brother by the ſame mother, with expreſſions of the tendereſt and moſt affectionate regard; nor did Joſeph, the viceroy of Egypt, for ſuch was the high rank he occupied, loſe any time in acquainting Pharaoh with the arrival of his brethren, and with the circumſtances of his father and his family. The king immediately gave orders for their being ſent for to Egypt, and for ſettling them in the richeſt part of the country. Goſhen was the diſtrict which Joſeph allotted to them; and there they were ſupplied with ample means of ſubſiſtence, whilſt the inhabitants of other parts of Egypt were ſuffering great diſtreſs on account of the famine, which ſtill continued. The long duration of this calamity drained the people of all their money, and conſtrained them at length to part with their cattle, their houſes, their land, and even their perſonal freedom for ſupport. (B.C. 1705.) Thus the whole kingdom of Egypt, the lands of the prieſts excepted, became the demeſne of the crown; and all the people were reduced to the ſervile condition of bondſmen to the crown. Moreover, the old owners were ſeparated from one another, and diſperſed through different parts of the kingdom, that they might thus forget their intereſt in the lands which they had ſold, and precluded from forming combinations for regaining them. In this inſtance, Joſeph's zeal for Pharaoh's intereſt cauſed him to overſtep the bounds which ſound policy and juſtice preſcribed; and contributed to eſtabliſh a deſpotiſm, which eventually proved very oppreſſive to the deſcendants of Joſeph, and the reſt of the

Iſraelites. In the laſt year of the famine, Joſeph informed the Egyptians that they might expect a crop during the following year; and that he would enable them to renew their attention to agriculture, by diſtributing among them freſh lands, cattle, and corn: but he ſtipulated this condition with them, that from henceforwards the fifth part of all the products of their lands ſhould be reſerved for the king, and that the reſidue ſhould be their own. From this time, (B.C. 1702,) as the people conſented to this regulation, it became a law, that remained in force for ſeveral centuries, that the fifth part of the produce of the whole kingdom of Egypt, the lands of the prieſts excepted, ſhould belong to the crown. After the death of Jacob, and the return of his brethren to Egypt from Canaan, whither they had attended the remains of their father (ſee JACOB), they were apprehenſive that Joſeph might retaliate the injuries which they had done him; and therefore they informed him, by a meſſenger, that it was their father's dying requeſt that he would forgive them, and continue to afford them his protection. Joſeph immediately took an opportunity of removing their ſuſpicion and anxiety, by repeated aſſurances of his unabated affection and zealous concern for their welfare. Having ſurvived his father about 60 years, he informed his brethren (B.C. 1635), that God, according to his promiſe, would bring their poſterity from Egypt to the land of Canaan; and he therefore made them pledge themſelves on oath, to bury him with his anceſtors. Joſeph, having occupied under ſix ſovereigns the office of viceroy of Egypt, during 80 years, retained it till his death, which happened when he had attained the age of 110 years, in the year 1635 B.C. When the Iſraelites took their departure from Egypt, they obſerved his injunction concerning the removal of his body; and as we read in Joſh. xxiv. 32. it was buried at Schechem, in the field which Jacob bought of Hamor. From Jerome we learn, that the Iſraelites erected a noble monument to his memory, which was to be ſeen in his time. We ſhall not enlarge this article by an account of the tales of the Talmudiſts and of the Koran (chap. xii.), but refer the reader to D'Herbelot's Bibl. Orient. art. *Jouſouph*, for ſpecimens of theſe legendary tales. Gen. xxx—l. Anc. Un. Hiſt. vol. iii.

JOSEPH I., in *Biography*, emperor of Germany, ſon of the emperor Leopold, was born in 1678. He was declared hereditary king of Hungary, and crowned in 1687. In 1690 he was elected king of the Romans, and aſcended the imperial throne on the death of his father, in 1705. He purſued the ſyſtem of the late emperor, and maintained the alliance againſt France, with England, Holland, and Savoy, in ſupport of the claim of the archduke Charles to the crown of Spain; in which war the allies were ſucceſsful. Joſeph was of a haughty and arbitrary diſpoſition, employed violent meaſures againſt all the oppoſers of his authority, and ſupported with a high hand all the claims of his houſe. In 1706 he put the electors of Bavaria and Cologne to the ban of the empire, for taking part with France; and having deprived thoſe princes of a great part of their eſtates, he beſtowed the ſame on his own relations and favourites. He quarrelled with the pope, whom he afterwards obliged to recognize his brother the archduke Charles as king of Spain. He made himſelf maſter of Italy, and levied contributions on Mantua, Parma, Modena, Lucca, Genoa, and other places. His armies defeated the revolted Hungarians; but in the midſt of his ſucceſſes, he was carried off by the ſmall-pox, in April 1711, at the age of thirty-three, owing, it was believed, to the unſkilfulneſs of his phyſicians. His character has been variouſly repreſented. He was impatient of oppoſition, active, and enterpriſing; and frequently purſued from motives of reſentment what he had firſt undertaken from policy. In his imperial capacity, he governed with more deſpotiſm than any of his predeceſſors; and the houſe of Bavaria was a monument of the inflexibility of his temper. Univer. Hiſt.

JOSEPH II., emperor of Germany, ſon of Francis of Lorraine and the empreſs-queen Maria Thereſa, was born at Vienna, in March 1741. Great care was taken of his education; and at the age of nineteen, he was married to Iſabella, the infanta of Parma. He had, at an early period, diſplayed a deſire of diſtinguiſhing himſelf, and military glory was his firſt paſſion. He was crowned king of the Romans in 1764; and having loſt his firſt wife, to whom he was tenderly attached, he married, in 1765, the ſiſter of the elector of Bavaria. In this ſame year, on the death of his father Francis I., he ſucceeded to the imperial crown without oppoſition. He now diſplayed great talents and activity, by new-modelling the armies, and reforming all the departments of government. He travelled through his dominions, and viſited Pruſſia, Italy, France, and Ruſſia: and on his return, among many other wiſe and excellent regulations which he adopted, he ſet apart one day in every week for receiving petitions and complaints from all his ſubjects, without any diſtinction of birth or fortune; and the officers of his court were expreſsly forbidden to repulſe any, even the meaneſt object, who came to implore his protection. "It behoves me," ſaid the emperor, "to do juſtice; and it is my invariable intention to render it to all the world, without reſpect of perſons." In the year 1771, Germany ſuffered the horrors of a famine, which was more or leſs felt in all the countries of Europe. But in ſeveral parts of Germany, the ſcarcity was ſo great, that vaſt numbers of people actually periſhed for the want of the commoneſt neceſſaries of life. During theſe calamities, the emperor joined the monarchs of Pruſſia and Ruſſia in the diſmemberment of Poland. The firſt treaty for this iniquitous buſineſs was ſigned in 1772, and which finally terminated in the total extinction of that unhappy kingdom. In 1780, by the death of the empreſs-queen, Joſeph ſucceeded to the crown of Hungary and Bohemia; and in the following year, he iſſued a decree in favour of the liberty of the preſs, which was followed by others equally liberal, particularly one in favour of a more liberal toleration. The ſuppreſſion of the inquiſition at Milan may be attributed to the prevalence of a ſimilar ſpirit in the imperial councils. He extended the privileges of ſubjects to the Jews; and he ſhewed his attention to economy, by certain regulations relative to penſions, and by retrenching many which had been granted by the benevolent facility of his mother. He promulgated a decree in favour of the liberty of the preſs; and by one of the articles, he allowed a free circulation to literary reviews, and other periodical publications: he even permitted that all ſtrictures upon the throne itſelf might be publiſhed with full ſecurity, provided they did not deſcend to the character of libels or paſquinades. "If," ſaid he, "they be founded in juſtice, we ſhall profit by them; if not, we ſhall diſregard them." In a journey to the Netherlands, the emperor gained the love of the people by his courteſy and generoſity. He carried into effect a project for reſuming that line of fortreſſes which was called the Dutch barrier, and was garriſoned by their forces. Theſe were all diſmantled, and the materials ſold. On this viſit he declared Oſtend a free port, and ordered ſeveral improvements to be made in the harbour at his own expence. The emperor afterwards demanded of the Dutch the free navigation of the Scheldt; but in this he was unſucceſsful. On his return to Vienna, he aboliſhed the ſyſtem of vaſſalage;

and took the moſt deciſive ſteps in eccleſiaſtical reform, and the reduction of the power of the church. Numerous ſuppreſſions of religious houſes took place throughout all his dominions; and in an imperial reſcript, all ſubordination whatever, in ſecular affairs, to the holy ſee was formally diſclaimed. Such proceedings awakened the moſt lively alarms in the papal court; and on this occaſion, pope Pius VI. made a journey to Vienna: but notwithſtanding the very flattering attentions which he received on his arrival, he found it impoſſible to procure an intermiſſion of thoſe reforms, which were now extended to the ſecular clergy and hierarchy, as well as to the religious orders or regulars; and only obtained a reſpite for ſome threatened religious foundations. In 1786 the emperor followed his attack on the papal authority, by calling an aſſembly of the eccleſiaſtical princes at Ratiſbon, in which it was reſolved to withdraw from the juriſdiction of the pope. In 1788 a declaration of war was publiſhed againſt the Turks, and in the ſame year the emperor in perſon reduced Schabatz; but this was followed by the defeat of prince Linchenſtein, who fell in the action. Soon after a bloody battle was fought between the Imperialiſts and the Turks, on the heights of Rohadin, in which neither party could claim the victory. The emperor now prepared to attempt the reduction of Belgrade; but notwithſtanding the great preparations made on this occaſion, his plans were defeated, and he had the mortification to witneſs the rapid deſtruction of his troops by a dreadful mortality. Putrid fever and dyſenteries of the moſt malignant kind ſpread their influence through the imperial armies: diſcontent and complaint became univerſal; and in a ſhort time, one of the fineſt armies in the world was reduced, in a ſingle campaign, to leſs than half the number of its original combatants; the remainder being loſt by mortality, deſertion, and the ſword, or rendered incapable of preſent ſervice by diſeaſe. In the mean time, Joſeph was labouring under the rapid decline of health, but ſtill continued to employ himſelf indefatigably in public affairs. Theſe, however, were moſtly of a kind to aggravate, by vexation and anxiety, his bodily diſorder. The Low Countries were again in a flame, and the moſt violent meaſures were taken to reduce the people to ſubmiſſion. Military execution took place in ſeveral cities, and a general gloom, bordering on deſpair, overſpread the provinces. At length an open inſurrection broke out, conducted with ſo much prudence and valour, that the imperial troops were repeatedly defeated: ſeveral important cities were taken poſſeſſion of by the inſurgents; and the ſtates of Flanders, on November 20th, 1789, ſeized the government of the province, openly declaring that the emperor had forfeited all title to ſovereignty. By the end of the year, Bruſſels had expelled its garriſon; and a treaty of confederation was formed between all the Belgic provinces as independent ſtates. Joſeph, almoſt on his deathbed, was farther mortified by a remonſtrance from the Hungarian nobility, demanding the reſtoration of their ancient rights and privileges. Willing to die in peace, he conſented to all their requiſitions, but inſiſted upon retaining three articles, which were highly creditable to his heart, *viz.* a general toleration, proviſion for the parochial clergy out of the revenues of ſome ſuppreſſed monaſteries, and certain conceſſions in favour of the liberty of the peaſants. He died with great compoſure, on the 20th of February 1790. Leaving no iſſue, he was ſucceeded by his brother Leopold. Joſeph had many private virtues, as well as many of the qualities of a great and good ſovereign. He was patient of fatigue, and poſſeſſed of an ardent mind. He applied himſelf with unremitting diligence to the ſuppreſſion of intolerance and ſuperſtition, and the promotion of induſtry, throughout his dominions. He has been accuſed of encroaching on the liberties of his Flemiſh ſubjects; and it will be readily conceded that he was not perfect: but his faults almoſt vaniſh among the truly glorious actions which contributed to the aggrandizement of his own name, and the permanent felicity of his people. Univer. Hiſt.

Joseph, king of Portugal, of the family of Braganza, was born in the year 1714, and ſucceeded his father in 1750. He was much beloved by his people, a circumſtance that enabled him to effect ſeveral important regulations, in which his good ſenſe and moderation were eminently conſpicuous. Senſible of the danger of ſudden changes, he advanced his deſigns by almoſt imperceptible ſteps, ſo as to prevent all juſt grounds of alarm and complaint. He ſubjected the powers of the infamous Inquiſition to ſome reſtriction, by directing that none of its ſentences ſhould be carried into execution till reviewed and approved by the privy council. He carried into effect a treaty concluded between Spain and Portugal juſt before his father's death, which was conſidered as inimical to his country, on the principle "that all engagements among ſovereigns ſhould be held ſacred and inviolable." This reign was marked, in 1755, with the terrible diſaſter of an earthquake, which deſtroyed a great part of the capital. A conſpiracy in 1758, headed by the duke of Aveiro, and favoured by the Jeſuits who had been baniſhed from court, brought his life into great danger. The principal conſpirators were ſeized and executed, and the whole order of Jeſuits was baniſhed the kingdom. Joſeph had afterwards a diſpute with the court of Rome, and a war with Spain: in the latter, Portugal was aſſiſted by the Engliſh, whoſe battalions, under general Burgoyne, checked the career of the invaders, and obliged them, before the end of the campaign, to retreat within their own limits. After the peace of 1763, little of importance occurred in the affairs of Portugal. The king's councils, in the latter years of his reign, were entirely governed by the marquis de Pombal, a man of enlarged views, but of a haughty and violent diſpoſition. A diſpute with Spain, about the limits of the two nations on the borders of Rio de la Plata in South America, occaſioned hoſtile preparations on both ſides, but little was effected by either. Joſeph died February 1777, and was ſucceeded by his daughter, Maria Frances Iſabella, who is ſtill queen, though in a deranged ſtate of mind, and an exile in South America. See PORTUGAL.

JOSEPH *of Exeter*, or JOSEPHUS ISCANUS, is mentioned as a remarkable example of purity of literary taſte and elegance of ſtyle, in an age generally reputed barbarous. He was a native of Devonſhire, and flouriſhed in the cloſe of the twelfth, and the commencement of the thirteenth centuries. He was an eccleſiaſtic, and patronized by Baldwin, archbiſhop of Canterbury. According to the learned Camden, he accompanied Richard I. of England into the Holy Land. He was author of two epic poems in Latin heroics. The firſt, in ſix books, is on the Trojan war; the other is entitled "Antiocheis," the war of Antioch, or the Cruſade; of this laſt only a fragment remains, in which the heroes of Britain are celebrated. The ſtyle of Joſeph is not only, for the moſt part, pure, but rich and ornamented, and his verſification approaches the beſt models of antiquity. His diction is compounded chiefly of Ovid, Statius, and Claudian, the favourite poets of the age. "Italy," ſays Mr. Warton, in his Hiſtory of Engliſh Poetry, "had at that time produced no poet comparable to him." He was author of love verſes, epigrams, and miſcellaneous poems.

JOSEPH, *St.*, in *Geography*, a ſmall iſland in the Indian ſea. S. lat. 5° 45′. E. long. 54° 10′.—Alſo, a town of Africa, in the country of Galam, on the Senegal; 10 miles E.S.E.

of Galam.—Alſo, a town of Canada, on the right bank of the river St. Lawrence. N. lat. 46° 48′. W. long. 71° 8′.—Alſo, a town on the W. coaſt of the iſland of Dominica; 10 miles S. of Portſmouth.—Alſo, a town of Weſt Florida, ſituated in a bay of the gulf of Mexico, to which it gives name. N. lat. 29° 48′. W. long. 85° 34′.—Alſo, a town of California.—Alſo, an iſland in the ſtraits of Marie, which convey the waters of lake Superior into lake Huron.—Alſo, a lake in North America, 31 miles long, and 15 broad, lying E. of lake Sal, and which ſends its waters by Cat lake river into Cat lake, and afterwards forms the S.E. branch of Severn river. Oſnaburgh houſe is on the N.E. part of the lake.—Alſo, a river which runs N.W. into the S.E. part of lake Michigan. The Pautewatamee Indians reſide on this river, oppoſite fort St. Joſeph. They can raiſe 200 warriors.—Alſo, a river in the iſland of Barbadoes, which runs into the ſea; four miles N.W. of Conſett's bay.—Alſo, a lake of Canada. N. lat. 50° 50′. W. long. 90° 35′.

St. Joseph, *Fort*, called alſo *Gallam*, a town of Africa, ſituated on the river Senegal, in N. lat. 14° 34′. W. long. 9° 21′.

Joseph *di Oruna*, *St.*, a town on the W. coaſt of the iſland of Trinidad. N. lat. 10° 25′. W. long. 60° 55′.

Joseph *le Precheur*, *St.*, a town of the iſland of Martinico.

JOSEPHINIA, in *Botany*, ſo named by Ventenat, in honour of his munificent patroneſs Joſephine, the now divorced empreſs of Buonaparte, whoſe claim to ſuch commemoration we have already admitted; ſee Humea. Venten. Malmais. 67. Brown. Prodr. Nov. Holl. v. 1. 519. Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Luridæ*, Linn. *Bignoniæ*, Juſſ. *Pedalinæ*, Brown.

Gen. Ch. *Cal.* Perianth inferior, in five deep, nearly equal, acute ſegments. *Cor.* of one petal, ringent; tube not much longer than the calyx; throat dilated, bell-ſhaped; limb five-lobed, ſpreading, two-lipped, the upper lip in two equal rounded ſegments, lower in three, of which the middle one is largeſt. *Stam.* Filaments four, awl-ſhaped, ſhorter than the corolla, two of them ſhorter than the reſt, with the rudiment of a fifth; anthers heart-ſhaped, of two cells. *Piſt.* Germen ſuperior, pyramidal, rugoſe; ſtyle cylindrical, about equal to the ſtamens; ſtigma in four equal, oblong, acute ſegments. *Peric.* Nut angular, muricated, of from four to eight cells. *Seeds* ſolitary, erect, oblong.

Eſſ. Ch. Calyx in five deep ſegments. Corolla ringent; throat bell-ſhaped; limb five-lobed, the middle ſegment of the lower lip longeſt. Stigma four-cleft. Nut of ſeveral cells, muricated. Seeds ſolitary, erect.

1. J. *Imperatricis.* Vent. Malmais. t. 67.—Germen of about four cells. Leaves lanceolate; elliptical, acute, downy beneath like the ſtem. Segments of the calyx equal. *Brown.*—Gathered by the French voyagers on the weſt ſide of New Holland, who brought ſeeds to the garden of La Malmaiſon, where they ſucceeded well. The plant is biennial, flowering in the middle of ſummer, decumbent, of an inelegant or lurid aſpect, with large, toothed, dull-green *leaves*. *Flowers* axillary, ſolitary, about an inch long, whitiſh, variegated and ſpotted with dull purple.

2. J. *grandiflora.* Brown. Prodr. v. 1. 520.—Germen of eight cells. Leaves lanceolate, pointed, ſlightly downy beneath. Stem ſmooth. Upper ſegment of the calyx half the length of the reſt. Loweſt ſegment of the corolla more than twice as long as the others. *Brown.*—Gathered by Mr. Brown in the tropical part of New Holland.

JOSEPHSTHAL, in *Geography*, a town of Bohemia, in the circle of Boleſlau; 12 miles N.N.E. of Turnau.

JOSEPHUS, Flavius, in *Biography*, an eminent Jewiſh hiſtorian, was born in the year 37, when Caligula was emperor. His father was Mattathias, deſcended from the ancient high-prieſts of the Jews: by his mother he was of the royal lineage of the Aſmonæans, who, for a conſiderable time, had the ſupreme government of the Jewiſh nation. He was educated together with his brother Mattathias, and made ſuch proficiency in knowledge, that when he was but fourteen years of age, the high prieſts, and ſome of the principal people of the city, came frequently to conſult him about the right interpretation of things in the law. In his ſixteenth year he retired into the wilderneſs, where he lived in great abſtemiouſneſs, and habits of ſelf-denial during the ſpace of three years. He ſtudied the principles of the leading ſects, and embraced, as the rule of his life and conduct, thoſe of the Phariſees, and being now nineteen years of age, he began to act in public. At the age of twenty-ſix he went to Rome, where, by means of a ſtage-player of his own nation, he obtained an introduction to Poppæa, the emperor Nero's wife, by whoſe intereſt he procured the releaſe of ſome prieſts, whom Felix had ſent priſoners from Jeruſalem. Returning home, he was appointed by the revolted Jews governor of the two Galilees, in which capacity, as a general, he bravely defended Jotapata againſt Veſpaſian, but which was taken after a ſiege of forty-ſeven days. When the city was in the hands of the conqueror, he gave orders to ſearch for Joſephus, who had eſcaped the general maſſacre, by concealing himſelf in a cavern cut in a rock. In this gloomy receſs he met with forty men of eminence who had concealed themſelves, and had with them proviſions ſufficient for their ſupport ſeveral days. Upon being diſcovered, he propoſed to the forty men who had taken refuge there with him, that they ſhould all ſurrender, and upon their determination rather to periſh by mutual wounds, he perſuaded them to caſt lots ſucceſſively, who ſhould kill the next man, and by an extraordinary circumſtance he and one other were left the ſurvivors of the reſt. This ſingle companion was eaſily prevailed upon to join him in accepting the proffered mercy of the Romans. On being taken before Veſpaſian, he boldly predicted that within a ſhort time the empire would fall to the ſhare of that general, by which prediction, which was afterwards fulfilled, he ſecured a favourable reception from him; though he was retained as a priſoner on account of the uſe which Veſpaſian intended to make of him in the farther proſecution of the war againſt the Jews. It ſhould ſeem that Joſephus flattered himſelf with the notion that he was inſpired with a knowledge of future events. "It is likely" ſays the judicious and learned Lardner, "that he often thought of Joſeph in Egypt, and of Daniel in Babylon, and was in hopes of making a like figure at the court of Rome. But I ſuppoſe it may be no diſparagement to Joſephus to ſay, that he was not equal to them in wiſdom, or in virtue and integrity." As ſoon as Veſpaſian was ſeated on the imperial throne, Joſephus was ſet at liberty, and was taken by Titus with him when he marched to lay ſiege to Jeruſalem. Here he ſaw the ruin of his country, of which he afterwards became the hiſtorian. He was ſent into the city with offers of peace upon condition of the ſubmiſſion of his countrymen. They deſpiſed his offers, and rejected his counſels with ſcorn. The Jews now conſidered him as a deſerter and traitor to their cauſe, and it is a fact that they never manifeſted any great reſpect for his writings. During the progreſs of the ſiege he did not ceaſe exhorting them to avoid their inevitable fate by a timely ſurrender, and once, approaching too near the walls, he received a wound which laid him ſenſeleſs on the ground. At the capture of the city, Joſephus obtained the liberation

Strahan and Preſton,
New-Street-Square, London.

tion of Matthias and ſeveral friends without ranſom; he had permiſſion alſo to ſave what he pleaſed out of the ruins; but he contented himſelf with a copy of the ſacred writings. The emperor heaped upon him his favours, and as a mark of his gratitude, he aſſumed their family ſurname of Flavius. He employed his leiſure in drawing up thoſe works which have immortalized his name. Theſe are, 1. "The Hiſtory of the Jewiſh war, and the taking of Jeruſalem," in ſeven books. It was written in the language of his own country, and he afterwards publiſhed it in Greek for the benefit of other nations. He profeſſes to have written with great fidelity, and appeals, for the truth of his hiſtory, to living witneſſes. He preſented the work to Veſpaſian and Titus, of whom the latter ordered it to be publiſhed, and ſigned it with his own hand to ſhew that it was authentic. 2. "The Jewiſh Antiquities" in twenty-four books, or the hiſtory of the Jews from the creation to the 12th year of Nero, in which the war began. To this is ſubjoined his life, written by himſelf, and dedicated to Epaphroditus, of whom we know nothing but from Joſephus himſelf, who deſcribes him as a lover of all kinds of learning, but as principally delighted with the knowledge of hiſtory, and this on account of his having been himſelf concerned in great affairs, and many turns of fortune, and having ſhewn a wonderful vigour of an excellent nature, and an immoveable virtuous reſolution in them all. 3. He wrote alſo "Two books againſt Apion of Alexandria," which is a vindication of the Jewiſh people againſt the calumnies of that Egyptian author. "A Diſcourſe on the Martyrdom of the Maccabees" is ſometimes aſcribed to him, but its genuineneſs is diſputed, and Mr. Whiſton who tranſlated the other works would not give this a place in his volumes. The works of Joſephus, though ſlighted by the Jews, are held in high eſtimation by Chriſtians; his ſtyle is pure, agreeable, and ſometimes eloquent; he has been called the Greek Livy; and, like that Roman writer, he is fond of diſplaying the powers of his own imagination by long ſpeeches. The hiſtory of the Jewiſh war, of which he was a ſpectator, is a moſt intereſting narrative. The beſt editions of the works of Joſephus, are thoſe of Hudſon in two vols. folio. Oxford, 1720, and of Havercamp, in two vols. Amſterdam 1726. There have been a multitude of Engliſh tranſlations; to that of Whiſton we have already referred. Univer. Hiſt. Lardner, vols. i. and vii. edit. 1788. And Joſephus's own Life.

JOSHUA, a canonical book of the Old Teſtament, containing a hiſtory of the wars and tranſactions of the perſon whoſe name it bears, who ſucceeded Moſes in the government of the Iſraelites, in the year 1451 B.C. at the age of 90 years, and was their conductor to the land of Canaan. He was the ſon of Nun, of the tribe of Ephraim, and born in the land of Goſhen, in the year 1536 B.C. At the period of the *Exodus* (which ſee), Joſhua was diſtinguiſhed by his talents and virtues, ſo that he was taken into the confidence of Moſes, and ſelected to command the Iſraelites, when they were attacked by the Amalekites, in their march from mount Horeb to mount Sinai. He was likewiſe honoured with the privilege of accompanying Moſes to mount Sinai, and of remaining with him forty days, when he received directions for the future government of the Iſraelites, and the laws written on the firſt tables of ſtone. He alſo accompanied Caleb, and other ten perſons who were deputed to examine the land of Canaan, previous to the invaſion of it by the Iſraelites. When Moſes was apprized of his approaching diſſolution, he confirmed Joſhua as his ſucceſſor in the moſt public and ſolemn manner. Although he was advanced in years when he conducted the Iſraelites to Canaan, he performed this arduous undertaking with ſingular prudence and valour. When they were paſſing the river of Jordan, in the extraordinary manner which is recorded in their hiſtory, he directed two monuments to be erected as a memorial of their miraculous paſſage, one on the ſpot where the ark had ſtood in the bed of the river, and the other on the ſhore; and from the banks of Jordan he proceeded towards the plains of Jericho, and pitched his tent for the firſt time in Canaan, the land of which he was taking poſſeſſion at Gilgal. For the conflicts and ſucceſſes that attended his future progreſs, we refer to his hiſtory. Having ſurveyed and divided the lands among the ſeveral tribes (B.C. 1445), he governed Iſrael in peace; and when he became ſenſible that the termination of his life could be at no great diſtance, he ſummoned all the tribes of Iſrael to Schechem, and recited the extraordinary operations of the providence of God in their favour, and having awakened in their minds a becoming ſenſe of gratitude, enforced upon them the wiſdom and duty of perſevering obedience to his laws, and exhorted them to renew the covenants by which they had already engaged to worſhip and ſerve him. This tranſaction was then ſolemnly regiſtered, and a monument for perpetuating it was erected near a great oak which was in Schechem. Soon after this event, *viz.* in the year B.C. 1426, Joſhua, having exhibited ample evidence of the propriety of his name, which denoted "Saviour," died in his retirement at Timnath-ſera, at the age of 110 years. The book of Joſhua, ſuppoſed to have been written by himſelf, and to have received ſome additions from Samuel and Ezra, (ſee BIBLE and CANON,) may be divided into three parts; the firſt of which is a hiſtory of the conqueſt of the land of Canaan; the ſecond, which begins at the twelfth chapter, is a deſcription of that country, and the diviſion of it among the tribes; and the third, compriſed in the two laſt chapters, contains the renewal of the covenant he cauſed the Iſraelites to make, and the death of their victorious leader and governor. The whole comprehends a term of ſeventeen, or, according to others, of twenty-ſeven years.

JOSIAH, king of Judah, deſerves particular mention on account of his wiſdom and piety, and ſome memorable events that occurred in the courſe of his reign. He ſucceeded to the throne, upon the aſſaſſination of his father Amon, at the age of eight years, in the year B.C. 640, and at a period when idolatry and wickedneſs, encouraged by his father's profligate example, very generally prevailed. Joſiah, who manifeſted the influence of pious and virtuous principles at a very early age, began in his ſixteenth year to project the reformation of the kingdom, and to adopt means for reſtoring the worſhip of the true God. At the age of twenty years he vigorouſly purſued the execution of the plans which he had meditated. He began with aboliſhing idolatry, firſt at Jeruſalem, and then through different parts of the kingdom; deſtroying the altars which had been erected, and the idols which had been the objects of veneration and worſhip. He then proceeded, in his twenty-ſixth year, to a complete reſtoration of the worſhip of God, and the regular ſervice of the temple. Whilſt he was proſecuting this pious work, and repairing the temple which had been long neglected, and which had ſunk into a ſtate of dilapidation, the book of the law, which had been concealed in the temple, was happily diſcovered. This was probably a copy of the Pentateuch, which had been lodged there for ſecurity by ſome pious prieſt in the reign of Ahaz or Manaſſeh. Joſiah, deſirous of averting from himſelf and the kingdom threatened judgments, determined to adhere to the directions of the law, in the buſineſs of reformation which he had undertaken, and to obſerve the feſtivals enjoined by Moſes, which had been ſhamefully neglected. With this view he aſſembled all the elders of the people in the temple at Jeruſalem, and

Strahan and Preſton,
New-ſtreet Square London.

having aſcended the throne, read the book of the Moſaic law, and then entered into a ſolemn covenant to obſerve the ſtatutes and ordinances which it enjoined. To this covenant the whole aſſembly teſtified their conſent. The ark was reſtored to its proper place; the temple was purified; idolatrous utenſils were removed; and thoſe appropriate to the worſhip of God ſubſtituted in their room. After theſe preparations, the paſſover was obſerved with ſingular zeal and magnificence. This took place in the eighteenth year of Joſiah's reign. But in purſuing his laudable plans of reformation, he was reſiſted by the inveterate habits of the Iſraelites, ſo that his zealous and perſevering efforts were ineffectual. Their degeneracy was ſo invincible, that the Almighty ſovereign was provoked to inflict upon them thoſe calamities which were denounced by the prophet Zephaniah. In the thirty-ſecond year of Joſiah's reign, Pharaoh Necho, king of Egypt, advanced with his army againſt Carchemiſh, a city ſituated on the river Euphrates; and he was oppoſed by the king of Judah; ſo that a bloody battle enſued at Megiddo, in which Joſiah received a mortal wound, which terminated in his death, after he had been conveyed to Jeruſalem, in the thirty-ninth year of his reign, B.C. 609. His death was greatly lamented by all his ſubjects; and an elegy was written on the occaſion by the prophet Jeremiah, which is not now extant. 2 Kings, xxii. xxiii. 2 Chron. xxxiv. xxxv.

JOSIDA, in *Geography*, a town of Japan, in the iſland of Niphon; 16 miles E. of Seoda.

JOSLOWITZ, a town of Moravia, in the circle of Znaym; 8 miles S.E. of Znaym.

JOSNIOW, a town of Poland, in Podolia; 48 miles N.N.W. of Kaminiec.

JOSQUIN des Prez, or, as he is called in Latin, *Joſquinus*, or *Jodocus Pratenſis*, and in Italian *Gioſquino del Prato*, in *Biography*, a Netherlander, the diſciple of Okenheim, and maeſtro di cappella to Louis XII. king of France, was the greateſt muſician of his time; and, in many particulars, of any time, ſince the invention of counterpoint.

His compoſitions for the church, though long laid aſide, and become obſolete by the gradual changes in notation, continue ſtill to merit the attention of the curious. Indeed the laws and difficulties of canon, fugue, augmentation, diminution, reverſion, and almoſt every other ſpecies of learned contrivance allowable in eccleſiaſtical compoſitions for voices, were never ſo well obſerved, or happily vanquiſhed, as by Joſquin; who may juſtly be called the father of modern harmony, and the inventor of almoſt every ingenious contexture of its conſtituent parts, near a hundred years before the time of Paleſtrina, Orlando di Laſſo, Tallis, or Bird, the great muſical luminaries of the ſixteenth century, whoſe names and works are ſtill held in the higheſt reverence, by all true judges and lovers of what appears to us the true and genuine ſtyle of choral compoſitions.

This ingenious, learned, and voluminous compoſer, is enumerated, by Lewis Guicciardini, among Flemiſh muſicians. However, the conſtant addition of Pratenſis, or Del Prato, to his name, ſeems rather to make him a native of Prato, in Tuſcany; and the frequent mention that is made of him by Italian writers, implies at leaſt, if he was not a native of Italy, that he had lived there, and that his works were very familiar to them; for not only by the name of Joſquino, Jodoco del Prato, is he often mentioned by Franchinus, and all the muſical writers of Italy in the next age, as a moſt excellent compoſer, but by miſcellaneous writers, who only ſpeak of muſic incidentally. As a proof of this, we need give no better authority than the following paſſage in Caſtiglione's admirable "Cortegiano."

This author, ſpeaking of the operations of prejudice in favour of great names, tells us of the eagerneſs and delight with which a polite company of his acquaintance had read a copy of verſes, ſuppoſing them to have been written by Sannazaro, who afterwards, when it was certain that they were not of his compoſition, thought them execrable. "So likewiſe," ſays one of the interlocutors, "a motet ſung before the ducheſs of Urbino was unnoticed, till it was known to be the production of Joſquin."

Franchinus, enumerating the great muſicians of his time, ſpecifies Tinctor, Gulielmus, Guarnerius, Juſquin de Pret, Gaſpar, Agricola, Loyſet, Obrecht, Brumel, Iſaac, and calls them *moſt delightful compoſers*.

The ſame author, in another work, lets us know that he had been perſonally acquainted with Joſquin: for, ſpeaking of ſome inaccuracies in the ſeſquialterate proportion, he ſays: "Di queſti inconvenienti ne advertite gia molti anni paſſati Juſquin Deſpriet et Gaſpar digniſſimi Compoſitori." This was printed in 1508, ſo that "many years ago," muſt throw theſe compoſers far back into the fifteenth century; and, he adds, "though they acquieſced in my opinions, yet, having been corrupted by *long habit*, they were unable to adopt them."

Zarlino, who likewiſe ſpeaks of him among the *pratici periti*, gives another inſtance of predilection in favour of Joſquin at Rome, "which," ſays he, "was at the expence of my friend, the admirable Adrian Willaert, who has often himſelf confirmed the fact." The motet "verbum bonum et ſuave," for ſix voices, having been long performed in the pontifical chapel at Rome, on the feſtival of our Lady, as the production of Joſquin, was thought to be one of the fineſt compoſitions of the time; but Willaert, having quitted Flanders, in order to viſit Rome, in the time of Leo X. and finding that this motet was ſung as the compoſition of Joſquin, whoſe name was affixed to it in the chapel books, ventured to declare it to be his own work, and not that of the famous Joſquin: but ſo great was the ignorance, envy, and prejudice of the ſingers, that, after this declaration, the motet was never again performed in the pontifical chapel.

Adami, in his hiſtorical liſt of the ſingers in the pope's chapel, mentions Joſquin next to Guido, as one of the great cultivators and ſupporters of church muſic; he calls him "Uomo inſigne per l'inventione," and ſays that he was a ſinger in the pontifical chapel during the time of Sixtus IV.

After quitting Italy, he was appointed maeſtro di cappella to Lewis XII. of France, who reigned from 1498 to 1515, and it is hardly probable that ſuch an honour ſhould have been conferred upon him till he had arrived at great eminence in his profeſſion; he muſt either have acquired the public favour by his works or performance, before he could be noticed by a ſovereign; indeed the impediments to their approximation muſt have been reciprocal, and it has been well obſerved, that it is as difficult for a prince to get at a man of merit, as it is for a man of merit to approach a prince.

It is related, that when Joſquin was firſt admitted into the ſervice of Lewis, he had been promiſed *a benefice* by his majeſty; but this prince, contrary to his uſual cuſtom, for he was in general both juſt and liberal, forgot the promiſe he had made to his maeſtro di cappella; when Joſquin, after ſuffering great inconvenience from the ſhortneſs of his majeſty's memory, ventured, by a ſingular expedient, to remind him publicly of his promiſe, without giving offence; for being commanded to compoſe a motet for the chapel royal, he choſe part of the 119th Pſalm: "Memor eſto verbi tui ſervo tuo;" "Oh think of thy ſervant, as concerning thy word;" which he ſet in ſo ſupplicating and exquiſite a manner, that it was univerſally admired, particularly by the king, who was not only charmed with the muſic, but felt the force of the words ſo effectually, that he ſoon after granted his petition, by conferring on him the promiſed preferment: for which act of juſtice and munificence, Joſquin, with equal felicity, compoſed, as a hymn of gratitude, another part of the ſame Pſalm : " Bonitatem feciſti cum ſervo tuo, Domine," " Oh Lord, thou haſt dealt graciouſly with thy ſervant."

Joſquin ſeems to have been poſſeſſed of a certain vein of wit and humour, as well as muſical genius ; of which Glareanus has given his readers ſeveral inſtances, beſides thoſe juſt related. In conſequence of the long procraſtination of the performance of Lewis XIIth's promiſe relative to the benefice, Joſquin applied to a nobleman, in high favour at court, to uſe his intereſt with this prince in his behalf, who, encouraging his hopes with proteſtations of zeal for his ſervice, conſtantly ended with ſaying, " I ſhall take care of this buſineſs, *let me alone*"—*Laiſſe faire moi* (*laiſſer moi faire*), when, at length, Joſquin, tired of this vain and fruitleſs aſſurance, turned it into ſolmiſation, and compoſed an entire maſs on theſe ſyllables of the hexachords *La ſol fa re mi* ; which maſs is among the productions of our author in the Britiſh Muſeum, and is an admirable compoſition.

The following circumſtance, which likewiſe happened during Joſquin's reſidence at the court of France, has been recorded both by Glareanus and Merſennus. Theſe writers inform us, that Lewis, though muſic afforded him great pleaſure, had ſo weak and inflexible a voice, that he never was able to ſing a tune, and that he defied his maeſtro di cappella to compoſe a piece of muſic in which it was poſſible for him to bear a part. However the muſician accepted the challenge, and compoſed a canon for two voices, to which he added two other parts, one of which had nothing more to do than to ſuſtain a ſingle ſound, and the other only the key note, and its fifth, to be ſung alternately. Joſquin gave his majeſty the choice of theſe two parts, and beginning with the long note, after ſome time, his royal ſcholar was enabled to continue it, as a drone to the canon, in deſpite of nature, which had never intended him for a ſinger.

Rabelais, in his prologue to the third book of Pantagruel, places Joſquin des Prez at the head of all the fifty-nine *Joyeulx Muſicines* whom he had formerly heard. Joſquin, among muſicians, was the giant of his time, and ſeems to have arrived at univerſal monarchy and dominion over the affections and paſſions of the muſical part of mankind. Indeed his compoſitions ſeem to have been as well known and as much practiſed throughout Europe, at the beginning of the 16th century, as Handel's were in England ſixty years ago.

In the muſic book of prince Henry, afterwards Henry VIII., which is preſerved in the Pepys' collection, at Cambridge, there are ſeveral of his compoſitions, and we are told that Anne of Boleyn, during her reſidence in France, had collected and learned a great number of them. In a very beautiful MS. in the Britiſh Muſeum, conſiſting of French ſongs of the 15th century, in three and four parts, there are likewiſe many of Joſquin's compoſitions. But the moſt capital collection of his works, and of contemporary contrapuntiſts which we believe is now ſubſiſting, is in the Britiſh Muſeum, conſiſting of the firſt and third ſet of the maſſes of Joſquin, compoſed for the pope's chapel, during the pontificate of Sixtus IV., who reigned from 1471 to 1484; with maſſes by Pierre de la Rue, Ant. Fevin, John Moreton, &c.

All theſe were printed by Ottavio Petruccio da Foſſombrone, under a patent from Leo X. ſigned by cardinal Bembo, his ſecretary. Theſe maſſes were the firſt muſical productions that iſſued from the preſs after the invention of printing. And theſe very curious compoſitions muſt have been ſtudied, and frequently rehearſed, before their performance ; for though no rapidity of execution is required, yet, as there are no bars, and the value of the notes is frequently changed by poſition, as well as by the modal ſigns, upon very ſhort notice, this, joined to the difficult ſolution of the canons, muſt have made it impoſſible for them to have been ſung at ſight, even by thoſe who were accuſtomed to the notation.

Specimens of theſe compoſitions in ſcore may be ſeen in Burney's Hiſtory of Muſic, vol. ii., and whoever examines them will find that no notes have had admiſſion by chance, or for the ſake of *rempliſſage*, but that, like the prints of Hogarth, every thing not only contributes to the principal deſign and harmony of the whole, but has a ſpecific character of its own.

But Joſquin's maſſes, though more frequently cited and celebrated by muſical writers than thoſe of any other author, and indeed than any of his other works, ſeem inferior to his motets in every reſpect ; for theſe are not only compoſed on ſubjects of his own invention, or in fragments of the moſt beautiful and ſolemn chants of the church, but in a ſtyle more clear and pleaſing.

In the third and fourth collection of motets publiſhed at the beginning of the ſixteenth century, under the title of " Motteti della Corona," there are many by Joſquin, which are truly admirable, particularly a miſerere for five voices, which, as it conſiſts of three movements, is too long to be inſerted in a work of this kind, but appears to us a model of choral compoſition, without inſtruments ; as the ſubjects of fugue and imitation are ſimple, and free from ſecular levity ; the ſtyle is grave and reverential ; the harmony pure ; the imitations are ingenious, and all conſtructed upon a fragment of canto fermo, to which the ſecond tenor is wholly confined : repeating it, in the firſt part, a note lower every time, beginning at the fifth of the key, and deſcending to its octave ; in the ſecond part, aſcending in the ſame manner ; in the third part, beginning at the fifth, and deſcending to the key note.

This ſpecies of laboured compoſition has been frequently cenſured, and ſtigmatized by the name of pedantry, and Gothic barbariſm, which, perhaps, it would *now* deſerve, out of the church ; but in the time of Joſquin, when there was little melody, and no grace in the arrangement, or meaſure of ſingle notes ; the ſcience of harmony, or ingenuity of contrivance in the combination of ſimultaneous ſounds, or muſic in parts, as it was the chief employment of the ſtudent, and ambition of the compoſer, ſo the merit of both, and the degree of regard beſtowed upon them by poſterity, ſhould be proportioned to their ſucceſs, in what was their chief object, and not in what had no exiſtence at the time in which theſe muſicians lived.

With reſpect to ſome of Joſquin's contrivances, ſuch as augmentations, diminutions, and inverſions of the melody, expreſſed by the barbarous Latin verb *cancrizare*, from the retrograde motion of the *crab*, they were certainly purſued to an exceſs ; but to ſubdue difficulties has ever been eſteemed a merit of a certain kind, in all the arts, and treated with reſpect by artiſts. Michael Angelo, in delineating the difficult attitudes into which he choſe to throw many figures in his works, and which other artiſts had not courage, or perhaps abilities to attempt, procured himſelf a great name among the judges of correct drawing, and bold deſign ; though a great part of the ſpectator's pleaſure in viewing them muſt ariſe from reflecting on the difficulty of the undertaking. There are different roads to the temple of Fame in every art ; and that which was followed by Joſquin, and his emulators, was too full of thorns, brambles, and impediments, to be purſued by men of common genius and abilities. Painting and ſculpture, which are to delight and deceive the eye, do not, any more than muſic, confine their powers to the mere endeavour at pleaſing the ſenſe of which they are the object; and there are pictures, ſtatues, and muſical compoſitions, which afford very little pleaſure but what is intellectual, and ariſing from reflection on the learning, correctneſs, and great labour which the artiſt muſt have beſtowed on them.

Canons of difficult ſolution were, to muſicians, a ſpecies of problem, and ſerved more to exerciſe the mind than pleaſe the ſenſe; and though a peculiar genius, or penetration, is requiſite for the quick diſcovery of riddles and rebuſſes, yet, ſtill more cunning is neceſſary to their production; and, however contemptuouſly theſe harmonical contrivances may be treated by the lazy lovers of more airy and ſimple compoſitions, the ſtudy of them is ſtill of ſuch uſe to muſical ſtudents, in their private exerciſes, that a profound and good contrapuntiſt has, perhaps, never yet been made by other means. Thoſe who deſpiſe this ſeeming Gothic pedantry too much, reſemble ſuch half-bred ſcholars, as have expected to arrive at a conſummate knowledge of the Roman claſſics, without ſubmitting to the drudgery of grammar and ſyntax. Indeed a great compoſer has, perhaps, never exiſted ſince the invention of counterpoint, who, at his moments of leiſure, has not attempted to manifeſt ſuperior learning and ſkill in the production of canons, and other difficult arrangements and combinations of ſound; and who, if he ſucceeded, was not vain of his abilities. Before the cultivation of dramatic muſic, as canon and fugue were univerſally ſtudied and reverenced, they were brought to ſuch a degree of perfection, as is wonderful; and though good taſte has long baniſhed them from the theatre, yet the church and chamber ſtill, occaſionally, retain them, with great propriety: in the church they preclude levity, and in the chamber exerciſe ingenuity.

As Euclid ranks firſt among ancient geometricians, ſo Joſquin, for the number, difficulty, and excellence of his muſical canons, ſeems entitled to the firſt place among the old compoſers, who have been moſt aſſiduous and ſucceſsful in the cultivation of this difficult ſpecies of muſical calculation.

But though the ſtyle of Joſquin, even in his ſecular compoſitions, is grave, and chiefly in fugue, imitation, and other contrivances, with little air or melody; yet this defect is amply ſupplied to contrapuntiſts, and lovers of choral muſic, by purity of harmony and ingenuity of deſign. Indeed, we have never ſeen, among all his productions that we have ſcored, a ſingle movement which is not ſtamped with ſome mark of the great maſter. And though fugue and canon were ſo univerſally cultivated in his time, when there were many men of abilities in this elaborate and complicated kind of writing; there is ſuch a manifeſt ſuperiority in his powers, ſuch a ſimple majeſty in his ideas, and ſuch dignity of deſign, as wholly juſtify the homage which he received.

It will, perhaps, be thought that too much notice has been taken of this old compoſer and his works; but as he is one of the great heroes of the art, and the type of all muſical excellence at the time in which he flouriſhed, the leſs need be ſaid of his contemporaries, who, in general, were but his imitators.

Joſquin, according to Walther (Muſicaliſches Lexicon), was buried in the church of St. Gedule, at Bruſſels, where his figure and epitaph are ſtill to be ſeen. His death muſt have happened early in the 16th century.

JOSS, or JOOSTJE, in *Mythology*, an idol worſhipped by the Chineſe at ſome of their grand feſtivals, which they obſerve by way of interceſſion for the ſick at Batavia and elſewhere. To this idol they offer coſtly preſents; and they alſo make a large veſſel of paper and combuſtible materials, adorning it with flags, and then ſetting it on fire till it is conſumed. The name Jooſtje, given to this idol by the Dutch, which the Engliſh ſeamen call Joſs, is a Dutch nick-name for the devil, and was probably given to this idol by the Dutch, when they firſt ſaw it, either from its appearance, or from the principle that all idolatry is demonolatry.

JOSSELIN, in *Geography*, a town of France, in the department of Morbihan, and chief place of a canton, in the diſtrict of Ploermel; 19 miles N.N.E. of Vannes. The place contains 2678, and the canton 14,157 inhabitants, on a territory of 215 kiliometres, in 10 communes. N. lat. 47° 57′. W. long. 2° 28′.

JOSSLIOKA, a town of Poland, in the palatinate of Sandomirz; 76 miles S.S.W. of Sandomirz.

JOSVO, a town of Hungary; 16 miles W. of Caſchau.

JOTAKO, a ſmall iſland in the Mediterranean; 2 miles E. of Teaki.

JOTAN, a town of Aſiatic Turkey, on the W. coaſt of Natolia, near cape Arbre; 10 miles N. of Milets.

JOTAPATA, in *Ancient Geography*, a town of Phœnicia, ſituated in the vicinity of Ptolemais. It was defended by Joſephus the hiſtorian, but at laſt taken by Veſpaſian, in the reign of Nero, A.D. 67. Its defence laſted for ſeven weeks, and 40,000 Jews were killed. Joſeph. de Bel. Jud.

JOUAN *de* L'ISLE, *St.*, in *Geography*, a town of France, in the department of the North Coaſts, and chief place of a canton, in the diſtrict of Dinan; 24 miles S. of St. Malo. The place contains 683, and the canton 8543 inhabitants, on a territory of 150 kiliometres, in 8 communes. N. lat. 48° 12′. W. long. 2° 29′.

JOUBERT, LAURENT, in *Biography*, a learned phyſician, and royal profeſſor at Montpellier, was born at Valence, in the province of Dauphiné, in France, on the 16th of December 1529, of a good family. After he had finiſhed his ſchool education, he went to Montpellier, where he was matriculated in the faculty of medicine on the 1ſt of March 1550, and took his degree of bachelor the following year. He afterwards ſtudied at Padua, where he attended the lectures of the celebrated Fallopius, and at ſome other places; but returning to Montpellier, he finiſhed his exerciſes, and received the degree of doctor in the year 1558. The manner in which he had performed his acts procured for him ſo much of the confidence and eſteem of Honoré Caſtellan, that this profeſſor, being ſummoned to court in the following year, to hold the office of firſt phyſician of Catharine de Medicis, queen of Henry II. he nominated Joubert to give the lectures in the ſchools during his abſence; and his nomination met with the ſanction of the faculty. Joubert ſhewed himſelf worthy of the honourable appointment, and acquitted himſelf in ſo diſtinguiſhed a manner, that on the death of profeſſor Rondelet in 1566, he was immediately named his ſucceſſor in the chair. He was likewiſe the ſecond ſucceſſor of Rondelet in the dignity of chancellor, having followed Saporta in 1574. He was called to Paris by Henry III. in 1579, who entertained hopes that Joubert would be able to cure the barrenneſs of Louiſa de Lorraine, his queen. But his attempts proved unſucceſsful; and he returned to Montpellier with the title of phyſician in ordinary to the king, and continued to practiſe his profeſſion there to the end of his life, which happened on the 21ſt of October 1583, when he was on the road from Thouloufe.

This phyſician was the author of ſeveral works, and wrote with much correctneſs and even elegance. A collection of thoſe, which were written in the Latin language, has been frequently reprinted under the title of "Operum Latinorum Tomus primus et ſecundus." The firſt edition is that of Lyons, in 1582, folio; the ſubſequent ones appeared at Frankfort, in 1599, 1645, and 1668, alſo in folio. The following have been publiſhed ſeparately: "Paradoxa Medica, ſeu de Febribus," Lyons, 8vo. 1566; "De Peſte, Quartana, et Paralyſi," ibid. 1567, 8vo. The treatiſe on the plague was alſo publiſhed in French, in 1581; "De affectibus pilorum et cutis, præſertim capitis, et de Cephalalgia. De affectibus internis partium Thoracis," Genevæ, 1572. Lugd. 1577, 1578; "Traité du Ris, ſon eſſence, ſes cauſes et effets," Paris, 1574, 1579, 8vo.; "Medicinæ Practicæ Libri tres," Lugd. 1577, 12mo.; "Pharmacopœia à Joanne Paulo, ſangmaiſtero, edita," ibid. 1579, 8vo.; "Traité des arcbuſades," ibid. 1581. This, however, is the third edition; the work was ſeveral times printed, and contains very correct opinions and precepts reſpecting the nature of gun-ſhot wounds; "Guidonis de Cauliaco Chirurgia Magna," ibid. 1585, with notes by the editor. The ſame work was tranſlated into French, by Iſaac Joubert, his ſon, and went through nine or ten editions; "Traitè des Eaux," Paris, 1603, 12mo. But of all the works of Laurent Joubert, that in which he ventured to raiſe his voice againſt popular medical errors, was the moſt diſtinguiſhed; "Erreurs populaires touchant la Médécine," Bourdeaux, 1579. This work made ſo great an impreſſion upon the public mind, that it was printed ten ſucceſſive times in the courſe of ſix months. Eloy. Dict. Hiſt. de la Med.

JOUER *des* Instrumens, *Fr.* to play upon muſical inſtruments. The French ſay *jouer du violon, de la baſſe, du hautbois, de la flute; toucher le clavecin, et les orgues; ſonner la trompette; donner du cor; pincer la guitarre.* They *play* on the violin, the violoncello, the hautbois, and the flute; but they *touch* the harpſichord and the organ; *ſound* the trumpet and French horn; and *pinch* the guitar.

JOUGH-HOLES, in *Mining*, is the name, in ſome parts of Derbyſhire, for lenticular cavities, principally in the vertical joints or in the veins, which are lined with cryſtals. Theſe are called tick-holes, druſes, lochs, neſts, &c. in other ſituations. The manner in which theſe curious holes were formed and left is endeavoured to be explained in Mr. Farey's Report on Derbyſhire, vol. i. p. 247.

JOVIALE Arcanum. See Arcanum.

Joviale *Bezoardicum.* See Bezoardicum.

JOVIAN, in *Biography*, a Roman emperor, born about the year 331, was a native of Singidunum, in Pannonia, and ſon of count Varronian, who had a high reputation in the ſtate, and who was enjoying, in honourable retirement, the fruit of his long ſervices. The ſon had been brought up to arms, and had obtained ſo much reputation as a commander, that although an avowed Chriſtian, the emperor Julian would not ſuffer him to reſign, upon offering to do ſo rather than quit his religion. On the death of Julian, in his expedition againſt the Perſian empire, June 363, Jovian, who was but the firſt of domeſtics, was nominated to the purple. At firſt a few voices only ſaluted him with the names of Emperor and Auguſtus. The tumultuary acclamation was inſtantly repeated by the guards who ſurrounded the tent, and paſſed, in a few minutes, to the extremity of the line. No prince was ever raiſed to the throne under more critical circumſtances. The Roman army, diſtreſſed and diſpirited, was retreating from the enemy's country towards its own frontiers, purſued and continually haraſſed by a much ſuperior force. He made a diſadvantageous peace with Perſia, ſhut up the heathen temples, recalled the baniſhed clergy, and from henceforth it was determined that Chriſtianity ſhould enjoy an uninterrupted triumph over heatheniſm. On arriving at Antioch he diſplayed his attachment to the orthodox doctrine, by reſtoring the churches to all the adherents of the council of Nice. At the ſame time, in order to quiet the minds of his ſubjects of the old religion, he iſſued a decree of toleration, permitting the exerciſe of the ceremonies of the pagan worſhip. He left Antioch in the winter-ſeaſon, and proceeded to Conſtantinople. He cauſed ſome ornaments to be added to the tomb of Julian, at Tarſus, as he paſſed. At Ancyra he aſſumed the title and enſigns of the conſulſhip, and conferred the ſame on his infant ſon. Dadaſtana, an obſcure town, at about an equal diſtance from Ancyra and Nice, was marked for the fatal term of his journey and his life. After indulging in a plentiful, perhaps an intemperate ſupper, he retired to reſt, and in the next morning he was found dead in his bed. The body of the deceaſed emperor was ſent to Conſtantinople to be interred with his predeceſſors. His ſudden death was imputed either to the effects of an overloaded ſtomach, or to the gas ariſing from burning charcoal, which had been placed in his chamber to dry the walls. This event happened in the eighth month of his reign, and in the thirty-third year of his age. Gibbon. Univ. Hiſt.

JOVIUS, Paul, an eminent hiſtorian, was born at Como, in Lombardy, in 1433. Having received a good education, he went to Rome, where he wrote a work, entitled "De Piſcibus Romanis." He had a penſion from Francis I. king of France; and Clement VII. gave him the biſhopric of Nocera, an office to which he did no credit, on account of his debauched manner of living. He died at Florence in 1452. His principal work is a hiſtory of his own time, which was publiſhed at Straſburgh in 1556. He alſo wrote the lives of illuſtrious men. He had a brother who wrote a hiſtory of Switzerland. Moreri.

JOULOPPED, in *Heraldry*, a term applied to the gills of a cock, when borne of a different tincture from his head.

JOULTS, in *Mining*, is applied, in Derbyſhire, to pieces of ſpar and lead-ore intermixed, from the ſize of walnuts to that of the fiſt. Sometimes theſe are called knockings, or hannaway. See Farey's Derbyſhire Report, vol. i. p. 369.

JOUNPORA, in *Geography*, a town of Hindooſtan, in Bahar; 25 miles S.W. of Patna.

JOURA, a barren iſland in the Grecian Archipelago, about 10 miles in circuit; 12 miles S.W. of Andros. N. lat. 37° 37′. E. long. 24° 46′.

JOURKOUP, a town of Aſiatic Turkey, in Caramania; 50 miles E.N.E. of Akſerai.

JOURNAL, a day-book, regiſter, or account of what paſſes daily. See Dairy.

Journal, in *Merchants' Accounts*, is a book into which every particular article is poſted out of the waſte book, and made debtor. This is to be very clearly worded, and fairly engroſſed. See Book-keeping.

Journal, in *Sea Affairs*, is a regiſter kept by the pilot, and others, wherein notice is taken of every thing that happens to the ſhip, from day to day, and from hour to hour, with regard to the winds, the rhumbs, the rake, ſoundings, &c. in order to enable him to adjuſt the reckoning, and determine the place where the ſhip is.

In all ſea-journals, the day, or what is called the twenty-four hours, begins at noon, and is counted thence twenty-four hours to the next noon: the firſt twelve hours, from noon to midnight, are marked with P. M. ſignifying after mid-day; and the ſecond twelve hours from midnight to noon are marked with A. M. ſignifying after midnight; ſo that the ſhip account is twelve hours earlier than the ſhore account of time. There are various ways of keeping journals, according to the different notions of mariners concerning the articles that are to be entered. Some writers direct the keeping ſuch a kind of journal as is only an abſtract of each day's tranſactions, ſpecifying the weather, what ſhips or lands were ſeen, accidents on board, the latitude, longitude, meridional diſtance, courſe, and run. Theſe particulars are to be drawn from the ſhip's log-book, or from that kept by the perſon himſelf. Other authors recommend the keeping only of one account, including the log-book, and all the work of each day, with the deductions drawn from it. The form of the latter kind of journal, with an example of the work of a ſingle day, is as follows:

Abſtract of a Journal from England towards Madeira.

Log-Board.

H	K.	F.	Courſes.	Winds.
2	9	6	N.W. by W. ½ W.	S. W. ½ W.
4	9	2	Leeway.	2 points.
6	9	5	S. ¾ W.	N. E. ½ E.
8	8	5	Leeway.	0 point.
10	8	7	W. S. W. ¼ W.	S. ¼ W.
12	7	2	Leeway.	2 points.
2	8	3	N. N. E. ¼ E.	S. ½ W.
4	8	7	Leeway.	0 point.
6	7	6	S. W.	S. S. E.
8	7	2	Leeway.	1½ point.
10	7	0		
12	6	4		

Traverſe Tables.

Courſes.	D.	N.	S.	E.	W.
N.W. ¾ W.	37	22,0			29,7
S. ½ E.	36		35,8	3,5	
W. by S.	30		6,6		33,6
N. by E.	31	33,6		6,6	
S. W. ¼ W.	56		37,6		41,5
		55,6	80,0	10,1	104,8
		D. I.	24,4	Dep.	94,7

			M. P.
Lizard's latitude	=	49° 57′ N.	3470
Ship's latitude	=	40° 52′ N.	2691
Diff. latitude	=	9° 05′	779
Or	=	554 miles.	
Lizard's longitude	=	5° 14′ W.	
Ship's longitude	=	15° 39′ W.	
Diff. long.	=	9° 25′ = 565 m.	
Lizard bears N.		37° 45′ E.	
Diſtance 685 miles.			

Remarks on Board.

♃. 13th of October.

Theſe twenty-four hours hard gales, and cloudy, weather accompanied with hard rains.

Handed fore-top-ſails.

At 10 P. M. heard a gun at a diſtance.

At 2 A. M. ſaw to the N. N. E. ½ E. the flaſh of a gun, and after ſifty-ſix beats of the pulſe at the wriſt, we heard the ſound, by which we judged the diſtance to be about eleven miles, and a ſhip in diſtreſs. Bore away to ſpeak with her.

At ſix, having greatly over-run the diſtance, and finding nothing, concluded ſhe was gone down, ſo hauled our wind, and ſtood to the S. W.

No obſervations this day.

Variation of 1¼ point weſt.

Departure, latitude	=	41° 16′ N.
Difference of latitude	=	0° 24′ S.
Preſent latitude	=	40° 52′ N.
Sum of latitudes	=	82° 08′
Middle latitude	=	41° 04′
Departure, longitude	=	13° 33′ W.
Difference of longitude	=	2° 06′ W.
Preſent longitude	=	15° 39′ W.

			A. M
Madeira's latitude	=	32° 38′ N.	2073
Ship's latitude	=	40° 52′ N.	2691
Diff. of latitude	=	8° 14′	618
Or	=	494 miles.	
Madeira's longitude	=	16° 51′ W.	
Ship's longitude	=	15° 39′ W.	
Diff. longitude	=	1° 12′ = 72 miles.	
Madeira bears	S.	6° 30′ W.	
Diſtant 505 miles			

Journal is now become a common name for newſpapers, which detail the daily tranſactions of Europe.

Journal is alſo uſed for the title of ſeveral books which come out at ſtated times; and give abſtracts, accounts, &c. of the new books that are publiſhed, and the new improvements daily made in arts and ſciences.

The firſt journal of this kind was, the “Journal des Sçavans,” printed at Paris: the deſign was ſet on foot for the eaſe of ſuch as are too buſy, or too lazy, to read the entire book themſelves. It ſeems an excellent way of ſatisfying a man's curioſity, and becoming learned upon eaſy terms; and ſo uſeful has it been found, that it has been executed in moſt other countries, though under a great variety of titles.

Of this kind are the “Acta Eruditorum of Leipſic;” the “Nouvelles de la Republique des Lettres” of M. Bayle, &c.; the “Bibliotheque Univerſelle, Choiſie, et Ancient et Moderne,” of M. le Clerc; the “Memoires de Trevoux, &c.” In 1692, Juncker printed in Latin, an “Hiſtorical Treatiſe of the Journals of the Learned,” publiſhed in the ſeveral parts of Europe; and Wolſius, Struvius, Morhof, Fabricius, &c. have done ſomething of the ſame kind. The “Philoſophical Tranſactions of London;” the “Memoirs of the Royal Academy of Sciences;” thoſe of the “Academy des Belles Lettres;” the “Miſcellanea Naturæ Curioſorum;” the “Experiments of the Academy del Cimento;” the “Acta Philo-exoticorum Naturæ et Artis,” which appeared from March 1686, to April 1687, and which are a hiſtory of the Academy of Breſſe; the “Miſcellanea Berolinenſia,” or Memoirs of the Academy of Berlin; the “Commentaries of the Academy of Peterſburg,” the “Memoirs of the Inſtitute at Bologna,” the “Acta Literaria Sueciæ,” the “Memoirs of the Royal Academy at Stockholm,” begun in 1740, the “Commentarii Societatis Regiæ Gottingenſis,” begun in 1750, &c. &c. are not ſo properly journals, though they are frequently ranked in the number. Juncker and Wolſius give the honour of the firſt invention of journals to Photius. His “Bibliotheca,” however, is not altogether of the ſame nature with the modern journals; nor was his deſign the ſame. It conſiſts of abridgments, and extracts of books which he had read during his embaſſy in Perſia. M. Salo firſt began the “Journal des Sçavans,” at Paris, in 1665, under the name of the Sieur de Hedouville; but his death ſoon after interrupted the work. The abbé Gallois then took it up, and he, in the year 1674, gave way to the abbé de la Roque, who continued it nine years, and was ſucceeded by M. Couſin, who carried it on till the year 1702, when the abbé Bignon inſtituted a new ſociety, and committed the care of continuing the Journal to them, who improved and publiſhed it under a new form. The other French journals are the “Memoirs and Conferences of Arts and Sciences, by M. Dennis, during the years 1672, 1673, and 1674;” “New Diſcoveries in all the Parts of Phyſic,” by M. de Blegny; the “Journal of Phyſic,” begun in 1684, and ſome others, diſcontinued almoſt as ſoon as begun. “Rozier's Journal de Phyſique,” begun in July, 1771; “Annales Chimiques,” &c. &c. The “Nouvelles de la Republique des Lettres,” News from the Republic of Letters, were begun by M. Bayle in 1684, and carried on by him till the year 1687, when M. Bayle being diſabled by ſickneſs, his friends, M. Bernard and M. de la Roque, took them up, and continued them till 1699. After an interruption of nine years, M. Bernard reſumed the work, and continued it till the year 1710. The “Hiſtory of the Works of the Learned,” by M. Baſnage, was begun in the year 1686, and ended in 1710. The “Univerſal Hiſtorical Library,” by M. Le Clerc, was continued to the year 1693, and contained twenty-five volumes. The “Bibliotheque Choiſie,” of the ſame author, began in 1703. The “Mercury of France” is one of the moſt ancient journals of that country, and was continued by different hands; the “Memoirs of a Hiſtory of Sciences and Arts,” uſually called Memoires des Trevoux, from the place where they are printed, began in 1701. The “Eſſays of Literature” reached but to a twelfth volume in 1702, 1703, and 1704; theſe only take notice of ancient authors. The “Journal Literaire,” by father Hugo, began and ended in 1705. At Hamburgh, they have made two attempts for a French journal, but the deſign failed: an “Ephemerides Sçavantes” has alſo been undertaken, but that ſoon diſappeared. A “Journal des Sçavans,” by M. Dartis, appeared in 1694, and was dropped the year following. That of M. Chauvin, begun at Berlin in 1696, held out three years, and an eſſay of the ſame kind was made at Geneva. To theſe may be added, the “Journal Literaire,” begun at the Hague in 1715, and that of Verdun, and the “Memoires Literaires de la Grande Bretagne,” by M. de la Roche; the “Bibliotheque Angloiſe,” and “Journal Britannique,” which were confined to Engliſh books alone. The Italian journals are, that of abbot Nazari, which laſted from 1668 to 1681, and was printed at Rome. That of Venice began in 1671, and ended at the ſame time with the other: the authors were Peter Moretti, and Francis Miletti. The “Journal of Parma,” by Roberti and father Bacchini, was dropped in 1690, and reſumed again in 1692. The “Journal of Ferrara,” by the abbé de la Torre, began and ended in 1691. “La Galerio di Minerva,” begun in 1696, was the work of a ſociety of men of letters. Seignior Apoſtolo Zeno, ſecretary to that ſociety, began another journal in 1710, under the protection of the grand duke: it was printed at Venice, and ſeveral perſons of diſtinction had a hand in it. The “Falti Eruditi della Bibliotheca Volante,” were publiſhed at Parma. There has appeared ſince, in Italy, the “Giornale del Letterati.”

The principal among the Latin journals is that of Leipſic, kept under the title of “Acta Eruditorum,” begun in 1682: P. P. Manzani began another at Parma. The “Nova Literaria Maris Balthici,” laſted from 1698 to 1708. The “Nova Literaria Germaniæ,” collected at Hamburgh, began in 1703. The “Acta Literaria ex Manuſcriptis,” and the “Bibliotheca Curioſa,” began in 1705, and ended in 1707, are the work of Struvius. Meſſrs. Kuſter and Sike, in 1697, began a “Bibliotheca Novorum Librorum,” and continued it for two years. Since that time there have been many Latin journals; ſuch, beſides others, is the “Commentarii de Rebus in Scientia Naturali et Medicini geſtis,” by M. Ludwig. The Swiſs journal, called “Nova Literaria Helvetiæ,” was begun in 1702, by M. Scheuchzer; and the “Acta Medica Hafnenſia,” publiſhed by T. Bartholin, make five volumes, from the year 1671 to 1679.

There are two Low Dutch journals; the one under the title of “Boockzal van Europe;” it was begun at Rotterdam, in 1692, by Peter Rabbus; and continued, from 1702 to 1708, by Sewel and Gavern: the other was done by a phyſician, called Ruiter, who began in 1710. The German journals of beſt note are, the “Monathlichen Unterredungen,” which held from 1689 to 1698. The “Bibliotheca Curioſa,” begun in 1704, and ended in 1707, both by M. Tenzel. The “Magaſin d'Hambourg,” begun in 1748; the “Phyſicaliſche Beluſtigunzen,” or Philoſophical Amuſements, begun at Berlin in 1751. The “Journal of Hanover,” began in 1700, and continued for two years by M. Eccard, under the direction of M. Leibnitz, and afterwards carried on by others. The Theological Journal, publiſhed by M. Loeſcher, under the title of "Altes & Neus," that is, Old and New. A third at Leipſic and Frankfort, the authors Meſſrs. Walterck, Krauſe, and Groſchuſſius, and a fourth at Hall, by M. Turk.

The Engliſh journals are, the "Hiſtory of the Works of the Learned," begun at London, 1699. "Cenſura Temporum," in 1708. About the ſame time there appeared two new ones, the one under the title of "Memoirs of Literature," containing little more than an Engliſh tranſlation of ſome articles in the foreign journals, by M. de la Roche; the other a collection of looſe tracts, entitled "Bibliotheca Curioſa," or a Miſcellany. Theſe, however, with ſome others, are now no more; but are ſucceeded by the "Monthly Review," which began in the year 1749, and gives a character of all Engliſh literary publications, with the moſt conſiderable of the foreign ones; the "Critical Review," which begun in 1756, nearly on the ſame plan: the "Anti-jacobin Review," begun in 1798; the "American Review," in 1811; the "Britiſh Critic," in 1798; the "Britiſh Review," in 1811; the "Eclectic Review," in 1805; the "Edinburgh Review," in 1803; the "London Medical Review," in 1808; the "Quarterly Review," in 1809. Beſides theſe we have ſeveral monthly pamphlets, called Magazines, which, together with a chronological ſeries of occurrences, contain letters from correſpondents, communicating extraordinary diſcoveries in nature and art, with controverſial pieces on all ſubjects. Of theſe are the following: *viz.* the "Agricultural," begun in 1799; the "Baptiſt," in 1809; the "Botanical," in 1786; the "Britiſh Farmer's," in 1811; the "European," in 1782; the "Evangelical," in 1793; the "Farmer's," in 1800; "Flower's Political," in 1807; "Freethinking; in 1811; "Gentleman's," in 1731; "Goſpel," in 1806; "Lady's," in 1771; "Methodiſt," in 1777; the "Monthly," in 1796; "Muſical," in 1809; "Military," in 1811; "Philoſophical," in 1798; "Sporting," in 1792; "Univerſal," in 1747. To theſe may be added ſeveral other periodical publications under different titles, ſuch as "Ackerman's Repoſitory," begun in 1810; "Antiquarian Cabinet," in 1806; "Arcana," in 1810; "Army Liſt," in 1809; "Chriſtian Obſerver," in 1802; "Chriſtian Guardian," in 1809; "Dramatic Cenſor," in 1811; "Edinburgh Medical Journal," in 1805; "General Chronicle," in 1811; "La Belle Aſſemblée," in 1806; "Lady's Muſeum," in 1798; "Literary Panorama," in 1806; "Medical Obſerver;" "Medical Compendium," in 1809; "Medical Journal," in 1799; "Monthly Repoſitory," in 1806; "Military Chronicle," in 1810; "Naturaliſt's Miſcellany," in 1789; "Naval Chronicle," in 1799; "Nicholſon's Journal," in 1802; "Philanthropiſt," in 1810; "Repertory of Arts," in 1794; "Retroſpect," in 1806; "Reflector," in 1810; "Satiriſt," in 1807; "Scourge," in 1811; &c. &c.

JOURNCHOPPERS, in our *Old Writers*, regrators of yarn; which formerly, perhaps, was called *journ*. They are mentioned in the ſtat. 8 Hen. VI. c. 5.

JOURNET, Françaiſe, in *Biography*, one of the greateſt actreſſes that has appeared on the ſtage of the French ſerious opera. She was at firſt admired for the mellifluence of her voice, her noble figure, and the charms of her action. She had an air and carriage ſo ſtriking, and ſomething ſo intereſting and touching in her countenance, that ſhe drew tears from thoſe who only looked at her in the part of Iphigenia. She had eyes and arms which guided to the heart all the expreſſion of what ſhe had to paint. She quitted the ſtage in 1720, after fifteen years applauſe and admiration, and died in 1722. Eſſais ſur la Muſique.

JOURNEY, in *Huſbandry*, ſignifies as much ground as can be ploughed over in a day, though it is not applied in the ſame way in all diſtricts, or has the ſame ſignification, as in ſome it is uſed to expreſs a much leſs proportion of labour. It often ſignifies the length of time the team is engaged in labour, either in ploughing or any other ſort of work. With all horſes under team labour, great attention ſhould be paid by the perſon who has the care of them, in feeding and dreſſing them. See Team.

Journey, *Sabbath-day's*. See Sabbath.

JOURNEY-MAN, formed from the French *journée, a day's work*; anciently ſignified a perſon who wrought with another by the day; though now, by the ſtatute, it extends to thoſe likewiſe who covenant to work with another in their occupation or trade by the year.

JOUTRA, in *Geography*, a town of Sweden, in Tavaſtland; 65 miles N.E. of Tavaſthus.

JOUVENCY, Joseph, in *Biography*, a learned Jeſuit, was born at Paris in 1643. He entered the ſociety of Jeſus in 1659, and was choſen profeſſor of rhetoric in its ſeminaries, firſt at Caen, then at La Fleche, and finally at Paris, where he taught with great reputation for nearly twenty years. He was invited to Rome in 1699, to aſſiſt in writing the continuation of the hiſtory of the ſociety, and died in that city in 1719. His part of the hiſtory of the Jeſuits compriſes the period from 1591 to 1616, and was printed in folio in the year 1710. As a philologiſt he is known by his "Latin Harangues delivered on different occaſions," in two volumes, 12mo.: "Appendix de Diis et Heroibus Poeticis," which is a compendium of the heathen mythology: "Notes on Terence, Ovid, Horace, Perſius, Juvenal, Martial, and ſome of the works of Cicero." He gave alſo a Latin verſion of the firſt Philippic of Demoſthenes. He is ſaid to have diſplayed, in his ſeveral works, great purity, elegance, and facility of ſtyle, for which he is more diſtinguiſhed than for novelty or depth of thought. Moreri.

JOUVENET, John, an hiſtorical painter, born at Rouen, in Normandy, in 1644. He received his firſt inſtructions from his father; but his principal teacher was Pouſſin, and his moſt uſeful ſtudies the works of that maſter.

He had a ready invention, and was therefore employed to adorn the apartments of Verſailles and the Trianon. In the Hoſpital of the Invalids at Paris, he painted the twelve apoſtles; each figure 14 feet high. It muſt be acknowledged, however, that he failed in true taſte. His ſtyle partakes too much of French flippancy; the ſubſtitution of ſomething ſtriking for what is ſolid and good; and his colouring is heavy. It is ſaid, that, being deprived of the uſe of his right hand by paralyſis, he painted ever after with his left. He died in 1717.

JOUVENU, in *Geography*, a town of France, in the department of the Saone and Loire, and chief place of a canton, in the diſtrict of Macon. The place contains 1469, and the canton 10,491 inhabitants, on a territory of 165 kiliometres, in 23 communes.

JOUX *la* Ville, a town of France, in the department of the Yonne; 9 miles N. of Avallon.

Joux, *Mont*, a part of mount Jura, near the ſource of the river Doubs, on the borders of Switzerland, and that part of the canton of Berne which borders on France.

Joux, a lake of Switzerland, in the canton of Berne, ſituated on a part of mount Jura; 4 miles W. of Romainmotier.

JOWA Town, *Lower*, a town of North America, on the

E. ſide of the river Miſſiſippi; which, between twenty and thirty years ago, could furniſh 300 warriors. N. lat. 40° 30'. W. long. 91° 15'.—The *Upper Jowa town* is about 15 miles below the mouth of the river Jowa, on the E. ſide of the Miſſiſippi, and could formerly furniſh 400 warriors.

JOWAN *el* Mugrah, a town of Algiers; 30 miles S.W. of Seteef.

JOWGONG, a town of Bengal; 18 miles S. E. of Burdwan.

JOWRASSER, a town of Hindooſtan, in Oude; 16 miles S E. of Lucknow.

JOWRIES, a cluſter of ſmall iſlands in the Mediterranean, near the E. coaſt of Tunis, oppoſite to Lempta, anciently called Tarichiæ, and thought by Cæſar to be of ſo much importance, that he appointed ſeveral ſtationary veſſels to ſecure them. N. lat. 35° 38'. E. long. 10° 56'.

JOY, in *Ethics*, is that paſſion which is produced by love, regarding its object as preſent, either immediately or in proſpect; in reality or imagination. This paſſion has been found to increaſe the perſpiration and urine of human bodies. See Pleasure and Pain.

JOYEUSE, in *Geography*, a town of France, in the department of the Ardèche, and chief place of a canton, in the diſtrict of L'Argentiere, 21 miles S.S.W. of Privas. The place contains 1074, and the canton 12,616 inhabitants, on a territory of 212½ kiliometres, in 18 communes. N. lat. 44° 29'. E. long. 4° 19'.

JOYNAGUR, a town of Meckley; 8 miles N.W. of Munnypour.

JOYNARANSHAUT, a town of Bengal; 18 miles E N E. of Iſlamabad.

JOYNER's Press. See Press.

JOYNERY, the art of working in wood, and of fitting or joining various parts or members of it together.

The French call it *menuiſerie*, from *minutaria*, ſmall work; by which it is diſtinguiſhed from *carpentry*, which is converſant in the larger and leſs curious work. See Joinery.

Joynery, *Column of*. See Column.

JOYPOUR, in *Geography*, a town of Bengal; 18 miles E N.E. of Iſlamabad.—Alſo, a town of Aſſam; 16 miles S.S.E. of Gentia.

JOZE, St., a town of Brazil, on the Tapajos; 45 miles S. of Pauxis.—Alſo, a town of Brazil, in the government of Minas Geraes; 80 miles S.W. of Villarica.—Alſo, a town of Brazil, in the government of Goyas; 75 miles E.N.E. of Villa Boa.

Joze, *St., de Dera*, a town of Brazil, on the Rio Negro; 205 miles from Fort Rio Negro.

Jozé *Azu*, a town of Brazil, in the government of Para; on the river Tocantin; 70 miles S.W. of Para.

JOZO, in *Ichthyology*, the name of a ſmall ſea-fiſh, of the ſea-gudgeon, or rock-fiſh kind, common in the Mediterranean, and called *gobius albus* by ſome authors. It is brought to market at Rome and Venice. See Gobius.

JOZZI, Giuseppe, in *Biography*, an Italian opera ſinger of the ſecond claſs, with a ſoprano voice, came into England with Monticelli, at the beginning of lord Middleſex's regency in 1742. He was a much better performer on the harpſichord than a ſinger. He gained great reputation here by his very accurate, brilliant, and expreſſive manner of executing Alberti's leſſons, and a conſiderable ſum of money by printing and ſelling them as his own compoſitions.

IPAM, in *Geography*, a town of Africa, on the Gold coaſt; 30 miles S.W. of Acra.

IPANEMA, a town of Brazil; 160 miles S.W. of Fernambuco.

IPECACUANHA, or Ipecacoanha, in *Pharmacy*, a little wrinkled root about the thickneſs of a moderate quill, brought hither from ſeveral parts of the Weſt Indies; much uſed as an emetic, and againſt diarrhœas and dyſenteries.

The firſt European who brought this root into uſe was an apothecary of Brazil, whoſe name was Michael Triſtaon. The book which the author publiſhed on this ſubject falling into the hands of the Engliſh, is tranſlated into our language, and ſtands, among a number of like accounts, among Purchas's Pilgrims.

He ſays it is an excellent remedy againſt dyſenteries and fluxes of all kinds. He ſays alſo, in its deſcription, that the ſtalks are a quarter of a yard long, and the roots nearly as much; and that the leaves grow only four or five upon a plant.

This agrees very well with all that we have ſince diſcovered of this plant: and the method of uſing it at that time, we find, was not as a vomit; but they bruiſed the freſh root, and ſteeped it about twelve hours in water, at the end of which time the patient drank the water early in the morning: it operated by ſtool; but after its operation, the natural purging and voiding of blood ceaſed. This ſeems the original account we have of this drug. De Laet, from this, compiled his account, which is almoſt a literal tranſlation of this into Latin: from his hint Piſo and Marggrave enquired after it more carefully upon the ſpot, and from them came the firſt accurate accounts we had of it; ſo that all ſeems, *ab origine*, deduced from Michael Triſtaon's account of it. Miller apprehends that the plant which furniſhes the true ipecaçuanha belongs to the genus of *Trioſteum*, or *falſe ipecacuanha*. It is, as ſome have thought, the *Pſychotria emetica* of Linnæus the younger. But the authority on which Mutis received the information is not to be implicitly followed.

Piſo divides this root into two ſorts, the white and the brown; or, according to Geoffroy, the Peruvian and Brazilian ipecacuanha: but three ſorts, ſays Dr Woodville, are diſtinguiſhable in our ſhops; *viz.* aſh-coloured or grey, brown, and white. The *aſh-coloured* is brought from Peru, and is a ſmall wrinkled root, bent and contorted into a great variety of figures, brought over in ſhort pieces full of wrinkles and deep circular fiſſures, down to a ſmall white woody fibre that runs in the middle of each piece; the cortical part is compact, brittle, and appears ſmooth and reſinous upon breaking; it has very little ſmell, the taſte is bitteriſh and ſub-acrid, covering the tongue, as it were, with a kind of mucilage. The *brown* is ſmall, ſomewhat more wrinkled than the foregoing; of a brown or blackiſh colour without, and white within: this is brought from Brazil. The *white* ſort is woody, has no wrinkles, and no perceptible bitterneſs in taſte. The firſt, that is, the aſh-coloured or grey ipecacuanha, is that uſually preferred for medicinal uſe. The brown has been ſometimes obſerved, even in a ſmall doſe, to produce violent effects. The white, though taken in a large one, has ſcarcely any effect at all.

There are divers falſe ſpecies of ipecacuanha, or roots, which, on account of their external appearance, bear the denomination of ipecacuanha, and are ſometimes ſold for it. Dr. Douglas mentions two: the one white, reſembling the true white, only larger in ſize, ſtraighter, and ſofter to the touch; the other brown, of a deeper colour than the true brown, and ſometimes mixed with red, whence it has alſo been called red ipecacuanha. Theſe are both produced in Maryland and Virginia, where they are uſed as vomitives by the lower ſort. Sir Hans Sloane has diſcovered that the latter is no other than the root of a poiſonous apocynum, deſcribed by him in his Natural Hiſtory of Jamaica. See Phil. Tranſ. N. 410.

The genuine ipecacuanha has ſcarcely any ſmell, unleſs during its pulverization, or infuſion in liquors; when it emits a faint nauſeous one. Geoffroy obſerves, that in pulverizing conſiderable quantities, the finer powder that flies off is apt to affect the operator with difficulty of breathing, a ſpitting of blood, a bleeding at the noſe, or a ſwelling and inflammation of the eyes and face, and ſometimes of the throat; which ſymptoms go off in a few days, ſpontaneouſly, or by the aid of veneſection.

Dr. Irving aſcertained by experiments, that this root contains a gummy and reſinous matter, and that the gum is in much greater proportion, and is more powerfully emetic, than the reſin: that the cortical part is more active than the ligneous; and that the whole root manifeſts an antiſeptic and aſtringent power. He alſo found its emetic quality to be moſt effectually counteracted by means of the acetous acid, inſomuch that 30 grains of the powder, taken in two ounces of vinegar, produced only ſome looſe ſtools.

The bark of ipecacuanha is ſaid to be preferable to its root, as an emetic; acting equally well, and with equal ſafety, in a ſmaller doſe, either in powder, or infuſion. Six grains of the bark, infuſed for a night in an ounce and a half of old Rheniſh, proves a good emetic. See Phil. Tranſ. N 476. ſect. 10.

The brown ipecacuanha yields, by diſtillation, a ſmaller quantity of oil than the grey; and the laſt portion of the ſpirit which comes over with the oil, on urging the fire to the greateſt violence, though it be conſiderably acid to the taſte, yet does not ſeem to contain leſs, but rather more volatile particles than the ſpirit drawn in the ſame manner from the grey. On mixing the ſpirits of both kinds alſo with ſalt of tartar, the volatile parts of that from the brown eſcape with more rapidity than thoſe from the ſpirit of the grey, and affect the noſe more ſenſibly.

It is rational to conclude from hence, that if the brown ipecacuanha contains leſs oil than the grey, it alſo contains leſs reſin; and that as this laſt portion of ſpirit contained more volatile parts, it muſt naturally be expected that it ſhould prove more violent in its operation than the grey. This obſervation alſo, which is countenanced by fact, may in ſome degree favour the opinion of thoſe who affirm, that the purgative virtues of medicines are excited by a volatile ſalt, and that they are more or leſs violent, as they contain more or leſs of this ſalt.

The brown ipecacuanha, as well as the grey, will afford two ſorts of extracts, a reſinous and a ſaline one; but both theſe are yielded in a ſmaller quantity from the brown than from the grey, and conſequently the reſiduum is always greater from the brown. Eight ounces of the grey ipecacuanha yield, with ſpirit of wine, ten drams of the reſinous extract; the ſame quantity of the brown, treated in the ſame manner, yields only ſix drams. From the reſiduum of this quantity of the grey kind, thus diveſted only of its reſin by the ſpirit, there may be procured, by a watery ſolvent, two ounces of a ſaline extract; but the reſidue of the ſame quantity of the brown will yield only five or ſix drams of this extract, by the ſame treatment. The reſidue of the grey, thus diveſted of its reſinous and ſaline parts, will weigh four ounces; and the reſidue of the brown, after the ſame treatment, will weigh ſix ounces. Hence it is very evident, that the active principles are much more abundant in the grey than in the brown kind of this uſeful root.

Neumann ſays that ſixteen ounces of good ipecacuanha will yield three ounces of reſinous matter, in which its virtue conſiſts, by means of ſpirit of wine; and from the ſame quantity, by means of water, five ounces of gummy matter were extracted.

If the proceſs of this analyſis be varied, and the watery menſtruum uſed firſt, the proportion of the ſaline extract will be greatly increaſed by it, and that of the reſinous greatly diminiſhed; eight ounces of the grey ipecacuanha, thus treated, yielding three ounces and a half of ſaline extract, and only thirty-ſix grains of the reſinous one afterwards by ſpirit of wine; and the ſame quantity of the brown yielding one ounce and three drams of the ſaline extract, and only twenty-four grains of the reſinous one, by means of ſpirit of wine afterwards uſed. From all this it is eaſy to perceive, that the brown ipecacuanha contains much leſs of the active parts, and much more of the terreſtrial, than the grey; and yet it is equally certain from trial, that the brown is much more violent in its operation than the grey.

This ſeems a perplexing ſort of paradox; but to explain it we muſt remember, that the virtues of medicines are not to be meaſured by their bulk nor their weight, the moſt powerful of all acting in the ſmalleſt quantities. It has been obſerved, that the laſt portion of ſpirit drawn from the brown is more pungent and ſtrong than that from the grey; and probably this part of the root has as much power to irritate the internal parts of the inteſtines as the reſinous parts.

The beſt menſtruum for extracting the entire virtue of the root, appears to be a mixture of one part of pure ſpirit, with two or three parts of water. In the ſhops, wine is employed: an ounce of the root is macerated or digeſted in a pint of Canary, or fifteen ounces of mountain, to which ſome add a quarter of an ounce of dried orange-peel. Theſe tinctures, in doſes of from half an ounce, or leſs, to an ounce and upwards, prove mildly emetic. Lewis Mat. Med.

It has been found by experience, that this is the mildeſt and ſafeſt emetic with which we are acquainted; having this peculiar advantage, that if it does not operate by vomit, it readily paſſes off by the other emunctories. It was firſt introduced to us with the character of an almoſt infallible remedy in dyſenteries and other inveterate fluxes, as diarrhœa, menorrhagia, and leucorrhœa, and alſo in diſorders proceeding from obſtructions of long ſtanding; nor has it loſt much of its reputation by time. The uſe of ipecacuanha in theſe fluxes is thought to depend upon its reſtoring perſpiration; for in theſe caſes, eſpecially in dyſentery and diarrhœa, the ſkin is dry and tenſe; and while the common diaphoretics uſually paſs off by ſtool, ſmall doſes of this root have been adminiſtered with the beſt effects, proving both laxative and diaphoretic. Dr. Cullen attributes its good effects entirely to its purgative quality. In common caſes of dyſentery, it is ſaid ſoon to perform a cure, by bringing on a free diaphoreſis, or plentiful ſweat, after the patient has taken a puke or two, and is covered up warm in bed. In putrid or malignant dyſenteries, it requires to be continued for ſeveral days, and repeated as an evacuant, with the aſſiſtance of rhubarb, cordial antiſeptics, and mild opiates, or aſtringents. In caſes requiring plentiful evacuation, or when the offending matter is lodged deep, ſir John Pringle recommends it to be given in ſmall doſes, and repeated at proper intervals, till vomiting and purging come on.

In the ſpaſmodic aſthma, Dr. Akenſide remarks, that when nothing contraindicates repeated vomiting, he knew no medicine ſo effectual as ipecacuanha. In violent paroxyſms, a ſcruple procures immediate relief. When the complaint is habitual, from three to five grains every morning, or from five to ten every other morning, may be given for a month or ſix weeks. This medicine has been alſo ſucceſsfully uſed in hæmorrhages. Several caſes of menorrhagia are mentioned by Dahlberg, in which one-third or half of a grain was given every four hours, till it effected a cure. Theſe ſmall doſes are likewiſe found of great uſe in catarrhal and even conſumptive caſes, as well as in various ſtates of fever. Dr. Cullen (Mat. Med. vol. ii.) informs us, that he knew a practitioner who cured intermittents by giving five grains of ipecacuanha, or enough to excite nauſea, an hour before the acceſſion of the fit was expected; and that Dr. Thompſon, formerly of Montroſe, propoſed to cure agues by the employment of emetics given at the time of acceſſion, or at the end of the cold ſtage; and this practice has alſo been ſucceſsful, and may indeed be executed by tartar emetic: but in trying ſuch practices, the ipecacuanha was found more manageable than the other, and generally more eaſy to the patient. Woodv. Med. Bot.

Ipecacuanha, *Baſtard*, in *Botany*, is a ſpecies of *aſclepias*, or ſwallow-wort.

Ipecacuanha, *Falſe*, or Dr. Tinkar's weed, from his having been one of the firſt perſons who brought the root into uſe. See Triosteum.

IPECA-GUACA, in *Ornithology*, the name of a Braſilian ſpecies of duck. It is of a middle ſize between the duck and gooſe, and is kept tame there for breeding and eating. It will fatten as well on dry land as when it has the uſe of water, and lays a vaſt number of eggs.

IPECATI-APOA, the name of a Braſilian ſpecies of duck called *pata* by the Portugueſe; the word in that language expreſſing gooſe. It is nearly of the ſize of the gooſe, but is exactly of the ſhape and figure of the common duck. It is very common in the Braſilian rivers, and is fleſhy and well taſted.

IPECU, the name of a Braſilian bird of the wood-pecker kind, called by Mr. Ray, *picus varius Braſilienſis*. It is of the ſize of a common pigeon. Its beak is ſtraight, and very hard and ſharp, and it pierces the bark and wood of trees with it, in the ſame manner as the European kinds. See Picus *lineatus*.

IPEK, in *Geography*, a river of Servia, which riſes in mount Hæmus, and runs into the Danube, near Galomtatz.

IPERSHEIM, a town of Germany, in the county of Schwarzenburg; 13 miles S.W. of Schainfeld.

IPERUQUIBA, in *Ichthyology*, a name by which ſome have called the *remora*, or ſucking-fiſh; called alſo by the Portugueſe, *piexe pogador*, and *piexe pioltho*. See Echinus.

IPHICRATES, in *Biography*, a celebrated Athenian general, was born in a humble rank of life; but by improving the ſituation in which he was thrown, he, at an early age, raiſed himſelf to a high military command. As he advanced in the army, he ſhewed himſelf a ſtrict diſciplinarian, and attentive to every circumſtance of military improvement. He made war againſt the Thracians, obtained ſome victories over the Spartans, and aſſiſted the Perſian king againſt Egypt. He changed the dreſs and arms of his ſoldiers, and rendered them more alert and expeditious in uſing their weapons. In the ſocial war, a fleet was fitted out by the Athenians for the recovery of Byzantium, under the joint commands of Iphicrates, Timotheus, and Chares. The two former differed from the latter on his propoſal to attack the enemy's fleet during a violent ſtorm, and were in conſequence charged by him with treaſonable intentions. They were recalled by the people of Athens, and publicly proſecuted. Timotheus was condemned, and went into exile: Iphicrates defended himſelf with great ſpirit, and was acquitted. He was indebted for this not only to his eloquence, but to the menacing appearance, round the tribunal, of ſeveral military partizans. When reproached for allowing and encouraging ſo violent a proceeding, he replied, "I have long borne arms for the ſafety of my country, and ſhould be a great fool not to employ them to ſave myſelf." From this time, however, he ceaſed to ſerve in the army. He lived to a great age, and ſaw his countrymen fully reconciled to him. He left one ſon, named Menetheus, by the daughter of the king of Thrace. Univer. Hiſt. Corn. Nepos.

IPHOFEN, in *Geography*, a town of Germany, in the duchy of Wurzburg; 15 miles E.S.E. of Wurzburg.

IPIALES, a town of South America, in the province of Popayan; 36 miles S. of Paſto.

IPOMŒA, in *Botany*, ſo called by Linnæus, from ἶψ, which he unaccountably miſtakes for the Convolvulus plant, whereas it means a creeping ſort of worm that infeſts and corrodes vines; and ὅμοιος, *like*. By this appellation he evidently intended to expreſs the cloſe reſemblance of *Ipomæa* to the genus *Convolvulus*, with which it agrees in habit altogether. Linn. Gen. 87. Schreb. 116. Willd. Sp. Pl. v. 1. 879. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed 2. v. 1. 338. Brown. Prodr. Nov. Holl. v. 1. 484. Juſſ. 134. Lamark Illuſtr. t. 104. (Quamoclit; Tourn. t. 39.) Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. *Convolvuli*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, oblong, ſmall, in five deep ſegments, without any appendages, permanent. *Cor.* of one petal, funnel-ſhaped, or bell-ſhaped; tube ſomewhat cylindrical, very long; limb five-cleft, ſpreading, with five plaits. *Stam.* Filaments five, awl-ſhaped, nearly the length of the corolla; anthers roundiſh. *Piſt.* Germen ſuperior, roundiſh; ſtyle thread-ſhaped, the length of the corolla; ſtigma capitate, nearly globoſe, in two or three lobes. *Peric.* Capſule roundiſh, of two or three cells. *Seeds* few, large, roundiſh, ſometimes hairy.

Eſſ. Ch. Calyx deeply five-cleft, naked. Corolla with five plaits, ſomewhat funnel-ſhaped. Stigma capitate and globoſe, lobed. Capſule of two or three cells. Seeds two in each cell.

A large genus, more correctly diſtinguiſhed from *Convolvulus* by the globoſe form of its ſtigma, than by the more narrow or tubular ſhape of the corolla. For want of attending to this, Linnæus and others have miſplaced ſeveral ſpecies. Jacquin in his *Collectanea*, v. 3. 303, has called the attention of botaniſts to this ſubject, and Mr. R. Brown in his *Prodromus* has recently thrown further light upon it, indicating, moreover, the want of bracteas or appendages to the calyx in *Ipomæa*, which are found in *Convolvulus*.

Examples of *Ipomæa*, eminent for their beauty, are I. *Quamoclit*, Linn. Sp. Pl. 227. Curt. Mag. t. 244, a native of the Eaſt Indies, remarkable for its finely pectinated leaves, and rich crimſon bloſſoms:—I. *coccinea*, Linn. Sp. Pl. 228. Curt. Mag. t. 221, found in the Weſt Indies, and eaſily cultivated, as an annual, in our gardens:—I. *Bona nox*, Linn. Sp. Pl. 228. Curt. Mag. t. 752, found alſo in the Weſt Indies, and rarely ſeen with us. The flowers of the laſt are large and white; we ſhould from the name, as well as their appearance, gueſs them to be fragrant in an evening.

Ipomœa, in *Gardening*, comprehends plants of the herbaceous flowery kinds; of which the ſpecies chiefly cultivated are the winged-leaved ipomœa (I. quamoclit), and the ſcarlet-flowered ipomœa (I. coccinea).

Of the ſecond ſpecies there is a variety with orange coloured flowers.

Method of Culture.—Theſe plants are increaſed by ſowing the well-ripened ſeeds in ſmall pots, plunging them in a mild hot-bed, or in the earth of the bed, in the early ſpring months, proper air and water being given. When the plants have attained ſome growth, and in the firſt ſort begin to climb, they ſhould be removed, with balls of earth about their roots, into the places where they are to grow; or, which is better for the firſt kind, into ſeparate large pots, replunging them in the bark hot-bed. They ſhould have proper ſticks ſet for them to twine about; ſome pots of the firſt kind being placed in the ſtove, as being more tender in their nature.

The firſt ſort affords variety in the ſtove, and among other tender potted plants in the ſummer; and the latter, in the fronts of warm borders, as well as among the leſs tender potted flowering plants.

IPOMOPSIS, in *Botany*, ſo called, by Michaux, from ἰπόω, *to ſtrike forcibly*, and ὄψις, *the ſight*, in alluſion, as it ſhould ſeem, to the dazzling brilliancy of the flowers of the original ſpecies. Michaux Amer. v. 1. 141. Sm. Exot. Bot. v. 1. 23. Ait. Hort. Kew. ed. 2. v. 1. 342. Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. *Polemonia*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, bell-ſhaped, membranous at the baſe; its limb in five, long, equal, linear, erect ſegments. *Cor.* funnel-ſhaped; tube cylindrical; limb in five, deep, ovate, nearly equal ſegments. *Stam.* Filaments five, inſerted into the upper part of the tube, awl-ſhaped, ſhorter than the limb; anthers roundiſh, two-lobed. *Piſt.* Germen ſuperior, ovate; ſtyle thread-ſhaped, about as long as the tube; ſtigma in three, deep, oblong, downy, ſpreading ſegments. *Peric.* Capſule rather ſhorter than the calyx, ovate, obtuſe, of three cells, and three valves. *Seeds* ſeveral in each cell, in two rows, acutely angular.

Eſſ. Ch. Calyx in five ſegments, membranous at the baſe. Corolla funnel-ſhaped. Stamens ſpringing from the tube. Stigma three-cleft. Capſule ſuperior, of three cells and three valves. Seeds ſeveral, angular.

1. *I. elegans.* Scarlet Ipomopſis. Michaux Amer. v. 1. 142. Sm. Exot. Bot. t. 13. (Ipomæa rubra; Linn. Syſt. Veg. ed. 14. 204. Polemonium rubrum; Linn. Sp. Pl. 231. Cantua coronopifolia; Willd. Sp. Pl. v. 1. 879. Quamoclit pennatum erectum, floribus in thyrſum digeſtis; Dill. Elth. 321. t. 241.) "Stem erect, ſtraight. Corolla thrice as long as the calyx."—A native of South Carolina, whence it was originally brought to Sherard's garden at Eltham. It has occaſionally been imported ſince from the ſame country, and was lately raiſed in great perfection at Meſſrs. Lee and Kennedy's, where the excellent figure in exotic botany was drawn. It flowers in September or October, and conſequently ripens ſeed with difficulty. According to all appearance this beautiful plant is a *biennial.* *Root* fibrous. *Stem* ſolitary, erect, becoming panicled at the height of four or five feet, round, leafy, and clothed, like the whole herbage, with ſhort, glandular, white hairs. *Leaves* pinnatifid; ſegments long and narrow, thoſe of the radical leaves ſhorter and broader; floral leaves ſimple. *Flowers* on ſhort ſtalks, drooping. *Corolla* equally five-cleft, of a brilliant ſcarlet, elegantly dotted on the inſide. *Stamens* ſlender, red; anthers yellow. *Germen* ſmooth, pale green. *Capſule* almoſt membranous, the partitions from the centre of the valves. *Seeds* in two rows, ſmall, not winged.

2. *I. inconſpicua.* Little Blue Ipomopſis. Sm. Exot. Bot. t. 14. Ait. Hort. Kew. ed. 2. v. 1. 342.—"Stem much branched and ſpreading. Corolla ſcarcely longer than the calyx. Segments of all the leaves linear."—Native of North America, and firſt raiſed, in 1793, at Sion Houſe, by Mr. Thomas Hoy, F.L.S. It flowered in November. *Root* annual. *Stems* numerous, about a foot high, leafy, round, pubeſcent as in the laſt ſpecies. *Leaves* alternate, pinnatifid; ſegments long and narrow, generally ſimple. *Flower-ſtalks* various in length, ſimple, ſolitary or in pairs, erect. *Calyx* with rather broader teeth than the foregoing. *Corolla* blue, with a white tube, by no means ſtriking or beautiful. *Stigma* purpliſh. *Capſule* ovate, thin, whitiſh.

Dr. Smith has obſerved, that this ſpecies ſerves to confirm the *Ipomopſis* of Michaux, with which it agrees ſo completely in every botanical character, that we find it not very eaſy to eſtabliſh even a ſpecific difference on ſound principles; while, on the other hand, it ſhews how different this natural genus is from *Cantua*, and all others to which it has been referred. The ſame author mentions a third ſpecies, *I. albida*, gathered by Dombey, at Lima, much like this, but upright; its leaves doubly pinnatifid, with ſomewhat elliptical lobes, and its flowers whitiſh.

IPPO, in *Natural Hiſtory*. See MACASSAR *Poiſon*.

IPS, in *Geography*, a town of Auſtria, ſituated near the conflux of the Ips and Danube, on the ſcite of the ancient Pons Iſis, on Iſipontium; 48 miles W. of Vienna. N. lat. 48° 13'. E. long. 15° 5'.

IPSALA, or SKIPSILAR, a town of European Turkey, in Romania; 53 miles S.W. of Adrianople.

IPSARA, called by the ancients *Pſyrea* or *Pſyria*, an iſland in the Grecian Archipelago, about ſix miles long and three wide; the ſoil is in general ſtony, and affords no great reſources to agriculture and commerce. It, however, produces figs, grapes, a ſmall quantity of cotton, and ſome corn, and red wine is an article of commerce. The inhabitants are chiefly Greeks, about 1000 in number, who pay a tribute of about 1000 crowns, and are ſubject to the cadi of Scio; ſix miles N.W. of Scio. N. lat. 38° 43'. E. long. 25° 35'. About a league from Ipſara lies a ſmaller and deſert iſland, called "Anti-ipſara, ſcarcely two leagues in circumference. Between theſe two iſlands ſhips find a very good anchorage.

IPSHEIM, a town of Germany, in the principality of Culmbach; 17 miles N.N.W. of Anſpach.

IPSILI, a ſmall iſland in the gulf of Engia.

IPSUS, in *Ancient Geography*, a town and river of Aſia, in Phrygia, S.E. of Synnada; famous for a battle fought here in the year 300 B.C. between Antigonus and Demetrius, having an army of 70,000 foot, 10,000 horſe, and 75 elephants, and the kings of Seleucus, Lyſimachus and Caſſandra, who had 74,000 infantry and 10,500 cavalry, 400 elephants, and 20 chariots of war. Antigonus was defeated and killed. Demetrius fled into Greece. The conquerors divided their lands between them.

IPSWICH, formerly called *Gippeſwich*, *Gippeſwid*, *Gyppewicus*, &c. in *Geography*, a borough and the county town of Suffolk, England, is ſeated on the northern bank of the river Orwell, at the diſtance of 18 miles N.E. from Colcheſter, 54 S.W. of Yarmouth, 12 N.W. of Harwich, and 69 N.E. of London. In the year 1800, it contained 2221 houſes, and 74,292 inhabitants. Near this place the river Gippen, or Gipping, unites its waters with the Orwell, which is navigable for 12 miles to the ſea at Harwich, where is a commodious haven, or harbour. Ipſwich appears to have been a town of ſome conſequence during the Anglo-Saxon dynaſty; for it was fortified with a vallum and foſs when the Danes made their depredatory incurſions into this part of the iſland. Within the ſpace of ten years they pillaged this town twice: firſt in, or near the year 991, and again in 1000. In the fifth year of king John's reign, the fortifications were repaired and materially ſtrengthened. The walls were provided with, at leaſt, four fortified gates; which were reſpectively called, from their relative ſituations, Eaſt-Gate, Weſt-Gate, North-Gate, and South-Gate; and the town was alſo divided into four leets or wards. Some fragments and parts of the old walls are ſtill remaining. Of the caſtle, no veſtige is left, either to prove its ſcite, or define its character. The liberties of the borough, however, extend beyond the walls, and comprehend the four hamlets of Stoke-Hall, Wikes-Ufford, Brooks-Hall, and Wikes-Biſhop. The extent of theſe liberties compriſes an area, meaſuring about four miles from eaſt to weſt, and nearly five miles in a tranſverſe direction. The corporation has alſo juriſdiction and advantageous privileges by water, on the Orwell to the ſea-port of Harwich. In the time of king Edward the Confeſſor, his queen held two parts of the borough, and her brother, earl Guert, a third part. When the Domeſday book was made, Roger Bigot, earl of Norwich, poſſeſſed the half hundred of Gippeſwid. At the former period, there were 538 burgeſſes reſiding here, who paid cuſtom to the king, but at the conqueſt there were only 110 burgeſſes, and in the Norman record it is ſtated, that "328 houſes are now empty." The firſt charter granted to the borough is dated 25th of May 1199, 1ſt of king John; this grants to the burgeſſes, 1, "The borough with all its appurtenances, liberties, &c. to be holden of the king and his heirs by the payment of the right and uſual annual farm, and 100 ſhillings more at the exchequer." This ſum is ſuppoſed to have amounted to ſixty marks, or 40*l.*: 2. The burgeſſes were alſo exempted from the payment of all taxes under the names of tholl, leſtage, ſtallage, paſſage, pondage, and all other cuſtoms by land, and at ſea-ports: 3. To have a merchant's gild, and hanſe of their own: 4. No perſon to be quartered on them without conſent, or any thing taken from them by force: 5. That they might hold their lands and recover their juſt dues from whomſoever they be owing:" which implies that the inhabitants were then conſtituted lawful ſubjects: "6. That they ſhould hold their lands and tenures within the borough, according to the cuſtom of the borough of Ipſwich: 7. That none of them ſhall be fined or amerced, but according to the laws of the free-boroughs: 8. And that they might chooſe two bailives and four coroners out of the more lawful men of the ſaid town." Suffolk Traveller.

After this charter was ratified and obtained, the burgeſſes aſſembled in the church-yard of St. Mary at Tower, and there held their firſt great court; appointed officers, &c. Here they continued to tranſact their public buſineſs till the 13th year of Edward I.'s reign, when that monarch ſeized the borough, and held it in ſubordination for ſix years. He then renewed and confirmed the charter, by public act, dated at Berwick, A. D. 1291. For this liberty the burgeſſes were required to pay an annual rent of 60*l.* to the king. Another charter was granted by king Henry VI.; but the moſt material act of this kind was procured in the 17th year of king Charles II. Among the privileges conferred on the burgeſſes by theſe charters, is that of ſending two members to parliament, who are elected by the votes of about 700 burgeſſes. The officers of theſe, and who are entruſted with the civil government of the place, are two bailiffs, a recorder, 10 portmen, and 24 common-councilmen. The borough is ſaid to have returned members *ab origine*. Like the generality of parliamentary boroughs, this has been the cauſe of much bribery, corruption, and litigation. A memorable inſtance of the latter occurred before a committee of the houſe of commons in 1780, when Mr. Cator, who had obtained a majority of votes by bribery, &c. was declared diſqualified to take a ſeat in the houſe, and a new writ was iſſued to elect another perſon. The particulars of this caſe are fully narrated in Oldfield's "Hiſtory of Boroughs," vol. ii.

In addition to the privileges already noticed, the corporate officers of Ipſwich are authorized to paſs fines and recoveries, try civil and criminal cauſes, and hold pleas of the crown. They alſo hold aſſizes of wine, bread, beer, &c. and have an admiralty juriſdiction, whereby they are entitled to all waifs, ſtrays, and goods caſt on ſhore. No freeman can be compelled to ſerve on juries out of the town; and every burgeſs is entitled to ſeveral advantageous privileges on ſailing to different ports.

Ipſwich at preſent contains twelve pariſh churches. In the Domeſday book nine are ſpecified: and in the year 1287 it is related in Stowe's Annals that ſome churches in this town, at Yarmouth, at Dunwich, &c. were deſtroyed by a violent ſtorm, and by the waves of the agitated ſea. The names of the preſent pariſhes, are, 1. St. Clement's, which is conſolidated with St. Helen's, and has no church: 2. St. Helen's, or Hellen's, is a rectory; 3. St. Lawrence's church is ſaid to have been begun by John Bottold, who died A.D. 1431. The chancel was erected by John Balwyn, who died in 1449; and a chantry was founded here, in 1514, by Edmund Dauntry, a poſtman of this town, who alſo cauſed the market croſs to be built: 4. St. Margaret's was impropriated to the priory of the Holy Trinity, the church of which was formerly ſtanding near St. Margaret's church-yard: 5. St. Mary's, at Elms: 6. St. Mary's, at Kay: 7. St. Mary's, at Stoke: 8. St. Mary's, at Tower: 9. St. Matthew: 10 St. Nicholas's: 11. St. Peter's: 12. St. Stephen's. Beſides theſe, the three following churches are in the vicinity of the town: 1. Thurleſton: 2. Whitton: and 3. Weſterfield. The monaſtic eſtabliſhments within the town were formerly very numerous, and ſeveral houſes, parts of buildings, and places, ſtill retain the names of the reſpective ſocieties. Theſe were, 1. The Holy Trinity, or Chriſt Church, a priory of Black canons: 2. St. Peter and St. Paul, a priory of Black canons: 3. St. Mary Magdalen, and St. James, a hoſpital for leprous perſons: 4. Dandy's Almſhouſes: 5. A houſe of Auſtin friars: 6, 7, and 8. Black friars, Gray friars, and White friars. For accounts of theſe eſtabliſhments, ſee Tanner's Notitia Monaſtica.

Ipſwich formerly contained ſeveral large houſes belonging to wealthy merchants and eminent perſons. Of theſe a few remain in reduced and dilapidated conditions. Among theſe are walls and a brick gateway to a building called Wolſey-college, which was appropriated and enlarged by Cardinal Wolſey for a dean, 12 ſecular canons, 8 clerks, and 8 choiriſters. To this college was annexed a grammar ſchool: but before the founder's deſign was carried into effect he was arreſted by king Henry VIII. and is ſuppoſed to have taken poiſon to eſcape an ignominious trial and execution. The ſcite of the college compriſed about ſix acres of land. The biſhop of Norwich had a palace called Curſon's-houſe, in Silent-ſtreet. Sir Andrew Windſor, afterwards lord Windſor, had a houſe in the pariſh of St. Mary, at Stoke. The archdeacon of Suffolk poſſeſſed a houſe, called Place or Palace, in Upper Brook-ſtreet. Part of the outer wall and gates lately remained. In the pariſh of St. Stephen were formerly two houſes, or manſions of conſiderable note: one of which belonged to, and was inhabited by Charles Brandon, duke of Suffolk; and the other to ſir Anthony Wingfield, knight of the Garter, vice-chamberlain and privy-counſellor to king Henry VIII. Some apartments of the latter ſtill remain, and are curious examples of the ſtyle in which ſuch manſions were ornamented. Several little houſes in this town are embelliſhed, both externally and internally, with carved and ſtuccoed devices; but theſe are chiefly of the age of James I. and Charles I.

The commerce and trade of Ipſwich, though not upon a large ſcale, furniſh employment to many of the poorer inhabitants, and fortunes to thoſe who poſſeſs property to ſpeculate with. Several veſſels belong to this town, and many have been built here. Four building yards are attached to the port. The chief trade of the place is malting. Ipſwich is ſupplied with five fairs annually, and five days out of the ſeven are appropriated for markets. For the accommodation of perſons frequenting theſe, a large, commodious market-place has been erected from deſigns by Mr. Brown, an architect of this town. A ſeries of buildings, on pillars, is diſpoſed round two quadrangular courts, in which perſons who frequent the market may be provided with ſhelter and accommodation for a ſmall annual, or weekly rent. The plan is judicious, and admirably adapted to its purpoſe. In this town are five charity-ſchools for the education and clothing of poor children.

On the quay is a cuſtom houſe: it was determined in the reign of Edward III. that the bailiff and burgeſſes of Ipſwich had the ſole right to take cuſtom-houſe duties for goods landed at the port of Harwich: whence it is inferred that the latter was a ſubordinate, and dependant port to the former. The tide commonly riſes from 10 to 12 feet: but at low water the river is ſhallow and narrow. At Ipſwich are the following public buildings: a town-hall, council-chamber, and ſhire-hall; a workhouſe, or hoſpital, and ſome alms-houſes.

Adjoining the town is a ſeat and park called Chriſtchurch, occupying the ſeite and lands of an ancient priory; and to the ſouth of Ipſwich are the following ſeats: Tattingſton-hall, Wolverſton-hall;—to the weſt are Chauntry, Sproughton, Burſtal, and Bramford, Hintleſham-hall, Stoke-hall, and Hill-houſe. Among the eminent natives of this town, the name of Thomas Wolſey is particularly diſtinguiſhed. He is ſaid to have been the ſon of a butcher, but this is doubted by the editor of the ſecond edition of "The Suffolk Traveller." It is evident, however, that he rapidly advanced from a low rank in ſociety, to be even the maſter of his tyrannical and ſelfiſh monarch; but at length he fell a ſacrifice to his own ambition and to the caprice of his king. He was born here March 1471, and died at Leiceſter Nov. 29, 1530. Several memoirs and accounts of him have been publiſhed, but an "*impartial* life" of him "is ſtill a deſideratum in Engliſh biography." Chalmers, in his intereſting "Hiſtory of the Colleges and Halls, &c. of Oxford," has given a ſhort and diſcriminating memoir of him, with references to, and obſervations on the cardinal's different biographers. The following names occur as "worthies" of Ipſwich: Ralph Brownrigg, D.D. and biſhop of Exeter: William Butler, phyſician, who, according to Fuller, "Worthies of England," (vol. ii. p. 340.) was the Æſculapius of the age." Mr. Raw, a reſpectable bookſeller of Ipſwich, is printing a hiſtory of this town. Suffolk Traveller, 2d edit. 8vo. 1764.

Ipswich, the Agawam of the Indians, a poſt-town and port of entry in America, pleaſantly ſituated on both ſides of Ipſwich river, in Eſſex county, Maſſachuſetts, 30 miles N.E. by N. of Boſton, and about a mile from the ſea. The townſhip of Ipſwich is divided into four pariſhes, and contains 601 houſes, and 3305 inhabitants, who are chiefly farmers; a few veſſels are employed in the fiſhery, and ſome few trade to the Weſt Indies: ſilk, thread, and lace, of an elegant texture, are manufactured here in large quantities, by women and children, and ſold for uſe and exportation in Boſton and other mercantile towns. Ipſwich townſhip was incorporated in 1634. It was formerly a place of conſiderable importance; but its decline is attributed to a barred harbour, and ſhoals in the river. N. lat. 42° 43′. W. long. 70° 50′.

Ipswich, *New*, a townſhip in Hillſborough county, Hampſhire, containing 1266 inhabitants; ſituated on the W. ſide of Souhagan river, and ſeparated from Whatſhook mountain by the N. line of Maſſachuſetts; 56 miles N.W. of Boſton. It was incorporated in 1762, and has a flouriſhing academy.

IQUEIQUY, or Iquique, an iſland in the Pacific ocean, near the coaſt of Peru, about a mile in circumference, ſituated in a ſmall gulf, which affords ſhelter for veſſels, but no freſh water. It is inhabited by Indians and ſlaves belonging to the Spaniards, who are employed in collecting a yellow earth, formed by the dung of birds, as manure for vines, and with which eight or ten ſhips have been loaded annually for a century. S. lat. 20 20′.

IQUISENQUI, one of the iſlands of Japan, ſituated near the S.E. coaſt of the iſland of Ximo. This iſland is very ſmall. N. lat. 32°. E. long. 132 40′.

IRABAD. See Hirabad.

IRABATTY, a name given to the river Ava, in ſome part of its courſe.

IRAC, Arabian, a country of Arabia Deſerta, ſituated to the ſouth of the Tigris and Euphrates; the ancient Babylonia or Chaldæa. This country, towards the N.E., is watered by branches of the Euphrates, and is fertile, containing a number of cities and towns: towards the S.W. it is a dreary wilderneſs. One of the principal places in it is Baſſora.

Irac, or *Irac-Ajemi*, a province of Perſia, chiefly correſponding with the ancient Ecbatana; is bounded on the N. by Ghilan and Mazanderan, on the E. and N.E. by Choraſan, on the S. by Farſiſtan, and on the W. by Khoſiſtan or Chuſiſtan, and the Arabian Irac. This province contains a part of ancient Media and Parthia: it is about 150 leagues in length, and 120 in breadth; and part of it conſiſts of barren mountains, or ſandy plains, which are altogether unproductive, but near the rivers there are extenſive and fertile plains. The air is healthy, but very dry; the climate is hot; and it hardly ever rains in the ſummer for ſix months together. Mount Taurus, which traverſes the province, furniſhes the animal that yields muſk: manna, of an exquiſite whiteneſs, is found in ſeveral places: galbanum is collected in the mountains near Iſpahan; and in ſeveral places they cultivate grapes, ſome of which are dried, and others afford white wine. In this province are reckoned about 40 towns or cities. Iſpahan, the capital of Perſia, is the chief.

IRACOUBO, a river of Guiana, which runs into the Atlantic. N. lat. 5° 35′. W. long. 54° 27′.

IRACUNDUS Musculus, in *Anatomy*, a name given by ſome authors to one of the muſcles of the eye, called alſo the rectus exterior and abducens. It is one of the quatuor recti oculi of Albinus, and is called by him and Douglas, as well as many others, the abductor.

IRAMALLY, in *Geography*, a town of Hindooſtan, in the circar of Dindigul; 30 miles W.N.W of Dindigul.

IRAPILLY, a town of Hindooſtan, in the Myſore country; 12 miles S.E. of Sankeridurgum.

IRASBURG, a townſhip of America, in Orleans county, Vermont, ſituated on Black river; 12 miles S. of the Canada line; containing 15 inhabitants.

IRASCIBLE, in the *Old Philoſophy*, a term applied to an appetite, or a part of the ſoul, where anger and the other paſſions, which animate us againſt things difficult, or odious, were ſuppoſed to reſide.

Of the eleven kinds of paſſions attributed to the ſoul, philoſophers aſcribe five to the iraſcible appetite; *viz.* wrath, boldneſs, fear, hope, and deſpair: the other ſix are charged on the concupiſcible appetite; *viz.* pleaſure, pain, deſire, averſion, love, and hatred.

Plato divided the ſoul into three parts; the reaſonable, iraſcible, and concupiſcible parts. The two laſt, according to that philoſopher, are the corporeal and mortal parts of the ſoul, which give riſe to our paſſions.

Plato fixes the ſeat of the iraſcible appetite in the heart; and of the concupiſcible in the liver: as the two ſources of blood and ſpirits, which alone affect the mind.

IRAVAT, or Iravati, in *Hindu Mythology*, the name of an elephant on which Indra, the regent of the firmament, and prince of the beneficent genii, rides. (See Indra.) It is generally painted with three trunks, or proboſci, and is driven by Indra's charioteer named Matali. The Hindus aſſign vehicles, which they call vahan, to their different deities, male and female. Thus, the vahan of Indra is Iravat (ſee Vahan); but not, it would appear, excluſively, for Major Moore, in the Hindu Pantheon, p. 261, ſays, that he has pictures in which other deities, Rama and Kriſhna in particular, are mounted on this favoured animal. Indra being a perſonification of the viſible heavens, his attributes and diſtinctions partake of firmamental alluſions. In his wars he employs many elephants, who are in fact clouds; and their names tranſlated mean *thunder*, *bearer*, *black*, *white*, *rumbler*, *growler*, &c. The chief of all theſe is Iravat, which means *watery*, the aqueous property of clouds being that moſt apparent; and we may, in this appropriate nomenclature, fancy that we diſcern ſome appearance of connection in the mythological machinery of the Hindus, generally at the firſt view ſo apparently anomalous and extravagant.

IRBEN, in *Geography*, a town of the duchy of Courland, on the coaſt of the Baltic; 18 miles E.N.E. of Windau.

IRBITSKAIA, a town of Ruſſia, in the government of Perm, on the Irbit; 100 miles N.E. of Ekaterinburg.

IRCUNDA, a town of Hindooſtan, in the circar of Cicacole; 20 miles S.W. of Cicacole.

IRE Holmes, two iſlands among the Orkneys, a little to the W. of the iſland of Sanda.

IREBY, High, or *Market-Ireby*, a pariſh and market-town in Allerdale-ward, in the county of Cumberland, England, is ſituated near the ſource of the river Ellen, 303 miles diſtant from London, and contained, according to the population return of the year 1800, 73 houſes, and 358 inhabitants. Here are two annual fairs, and a weekly market on Thurſday. The town, though now inconſiderable, is of great antiquity, and was, in the opinion of Camden, the "Arbeia of the Romans, where the Barcarii Tigrienſes were ſtationed;" but Horſley diſſents from this evidence, and aſſerts, that no Roman antiquities were ever found here; and that the affinity of names has leſs force in this inſtance, as there is another Ireby in Lancaſhire, on the borders of Weſtmoreland and Yorkſhire. This gentleman, with Mr. Ward, places the Arbeia at Moreſby, where remains have been dug up, and the ſcite of a ſtation is evident. Beauties of England and Wales, vol. iii.

IREDELL, a county of America, in Saliſbury diſtrict, North Carolina, ſurrounded by Surry, Rowan, and Burke. The climate is ſalubrious, the lands beautifully variegated with hills, and the ſoil rich. It contains 8761 inhabitants, of whom 1481 are ſlaves. Iredell court-houſe has a poſt-office; 25 miles from Saliſbury.

IREGA, a town of Hindooſtan, in the circar of Adoni; 50 miles W.N.W. of Adoni.

IREJ, a town of Hindooſtan, in the circar of Gohud; 70 miles E. of Narwa. N. lat. 25° 37'. E. long. 79° 40'.

IRELABOO, a town on the N. coaſt of the iſland of Sumatra. N. lat. 5° 9'. E. long. 96° 15'.

IRELAND, a large and fertile iſland in the Atlantic ocean, lying on the weſt of Great Britain, from which it is ſeparated by the Iriſh ſea, or St. George's Channel. It contains the moſt weſtern land in Europe, if we except Iceland, and it has no country between it and the coaſt of Labrador in North America. The ſea which ſeparates it from Great Britain, varies in breadth from 14 to 40 leagues; but is contracted between Scotland and the county of Down to a channel only ſix leagues wide, and farther north to a ſtill narrower ſtrait of leſs than four, between the N.E. point of the coaſt of Antrim and the Mull of Cantyre.

The general figure of Ireland ſomewhat reſembles a parallelogram, the greateſt length of which that can be meaſured along a meridian, is from Bloody Farland Point, in the county of Donegal, to the Stags of Cork harbour; this does not exceed 185 Iriſh, or 235½ Engliſh miles. It is much indented on the eaſt by the Iriſh ſea, and on the weſt by the Atlantic ocean, ſo that its breadth is very unequal. Between Emlagh Raſh, in Mayo, and the mouth of Strangford lough, which is the greateſt, there are 143 Iriſh (182 Engliſh) miles, whilſt between the bays of Dublin and Galway there are but 86 Iriſh miles, and between Dundalk and Ballyſhannon no more than 67. It will not, therefore, appear ſurpriſing, that there is not a ſpot in Ireland which is fifty miles diſtant from the ſea. If a diagonal line be drawn from Fairhead, the north-eaſtern point, to Mirenhead, the ſouth-weſtern point, it will meaſure 241 Iriſh, or 306 Engliſh miles, which is the greateſt diſtance between any two points of the iſland. The number of Iriſh plantation acres is above 12 millions, which is nearly equal to 20 millions of Engliſh acres.

The ſituation of Ireland is peculiarly favourable for receiving and beſtowing the reciprocal benefits of external commerce. Its communication is open and direct with England, France, Spain, Portugal, the coaſt of Africa, the Eaſt Indies, South America, the Weſt Indies, the United States of America, Newfoundland, Hudſon's Bay, Greenland, &c., with by far the greateſt part of the richeſt, the moſt fertile, the moſt commercial, and the moſt mutually dependent countries in the world; with countries abounding in an endleſs variety of commodities, furniſhing every material on which the varied induſtry of man can be employed, and preſenting the utmoſt allurements to the enterpriſing trader. It ſeems deſtined by nature, ſays Mr. Newenham, to be the great emporium of the commodities of Europe and America; and, indeed, of thoſe of almoſt every maritime country upon the ſurface of the globe.

The face of the country affords a pleaſing variety. In ſome parts there are rich and fertile plains, watered by large and beautiful rivers; in others frequent hills produce that intereſting ſucceſſion of objects with which a flat country can never abound. In two or three counties, there are moſt romantic and pictureſque ſcenes, whilſt in others, extenſive plains have been converted into moſſy moraſſes. A ſufficient quantity of wood, however, is wanting in moſt parts to render the views as intereſting as the general character of the country would lead us to expect. That this was not the caſe in former times, is evident from various accounts. Giraldus Cambrenſis, quoted by Camden, Stanihurſt, and other old writers, ſpeak of it as covered with woods, which are alſo often referred to in acts of parliament, and other public documents. Theſe were partly cut down to deprive the natives of their faſtneſſes, and partly for the purpoſe of extending agriculture. In the reigns of James I. and Charles I., during the continuance of peace, a very extenſive exportation took place, chiefly of pipe ſtaves and other ſmall timber; and beſides what was conſumed in domeſtic fuel, immenſe quantities were charred for the iron works which were carried on in different parts of the iſland. As no attention was paid to renewing them, the foreſts were ſpeedily reduced. Yet Boate, whoſe work was publiſhed about the middle of the ſeventeenth century, informs us that there were ſtill ſundry great woods remaining in all the provinces, ſome of them many miles long and broad. All theſe have ſince been demoliſhed, and there does not exiſt in Ireland any tract deſerving the name of a foreſt: but the whole country is cleared for the purpoſes of agriculture, and retains none of the vaſt woods to be found in the ſavage ſtate, yet Ireland is not deſtitute of woods that are both uſeful and ornamental. A ſpirit of planting has been prevalent for ſome years paſt, which has been powerfully encouraged by the premiums of the Dublin Society, as well as by ſeveral acts of parliament for the protection of timber, ſo that the country begins to aſſume a leſs naked appearance, and will, perhaps, become once more entitled to its old name of the Woody iſland.

Ireland has been ever celebrated for the fertility of its ſoil. The richeſt land is that which lies near the principal rivers, but there is not much which can be called bad; and the proportion of that which is waſte was not thought by Mr. Arthur Young, ſo long ago as the year 1778, to be as great as in England. The moſt uncultivated tracts are the mountainous diſtricts in all the weſtern counties, which ſeem placed as barriers againſt the fury of the vaſt Atlantic. In every part of Ireland there is ſtone either near the ſurface or at no great depth, which Mr. Young conſidered as the greateſt ſingularity of Ireland. "May we not recognize in this," he continues, "the hand of bounteous Providence, which has given, perhaps, the moſt ſtony ſoil in Europe to the moiſteſt climate in it? If as much rain fell upon the clays of England, (a ſoil very rarely met with in Ireland, and never without much ſtone,) as falls upon the rocks of her ſiſter iſland, thoſe lands could not be cultivated. But the rocks here are clothed with verdure; thoſe of limeſtone, in particular, with only a thin covering of mould, have the ſofteſt and moſt beautiful turf imaginable." Light ſandy ſoil is ſeldom met with, and chalk has not been found in any part of the iſland, though there is a white limeſtone ſomewhat reſembling it.

The mountainous chains in Ireland are neither numerous nor important; but an upland ridge divides the country from the N.E. to the S.W., giving birth to ſeveral of the rivers. The Iriſh hills generally form ſhort lines or detached groups, which are ſo diſperſed through the country, that there is ſcarcely any part in which the proſpect is not terminated by this ſpecies of majeſtic ſcenery. There are none, however, equal in height to ſeveral in Great Britain, the higheſt probably falling ſhort of 3000 feet; yet there are a few, ſuch as Mangerton and M'Gillicuddy's Reeks, near the lake of Killarney, and Brandon, near Dingle, in Kerry; Croagh Patrick and Nephin in Mayo; and Sliebh-Donard, one of the Mourne mountains, in the county of Down, which deſerve the attention of the naturaliſt, as they have been found to produce many of thoſe plants peculiar to Alpine regions.

As the whole of the country is found to have ſtone near the ſurface, it was natural to expect that it contained valuable minerals; and we accordingly find that ſuch an expectation was early formed, though, hitherto, much pains do not ſeem to have been taken to diſcover them, and render them uſeful. A plan was indeed recommended by Mr. Kirwan, which, if it had been adopted, would have eſtabliſhed a complete mineralogical ſchool in Ireland, and would thus have not only led to the diſcovery of the minerals, but have alſo inſtructed in the mode of procuring them with moſt advantage. As, latterly, attention has been excited to the ſubject, much progreſs may be ſhortly expected. The limeſtone quarries, which abound almoſt every where, are now generally worked, and afford a moſt valuable manure. A great variety of marbles is found, ſome of which are uncommonly beautiful, and capable of a very high poliſh, ſo as to leave little cauſe to regret the difficulty of procuring Italian marbles. Gypſum, ſo valuable a material in the hands of the ornamental artiſt, is found in great abundance near Belfaſt, and fuller's-earth has been found in ſeveral counties. The mountains of granite in Wicklow and Carlow ſupply the capital with this uſeful ſtone for building; and ſlates of excellent quality are found in many parts of the iſland. The beds of coal, to be ſeen in various regions of Ireland, have not yet been properly explored. That of Kilkenny, found at Caſtlecomer, is deſervedly celebrated among mineralogiſts as the pureſt coal of the kind to which it belongs, which is the *ſtone* or *uninflammable* coal. This is the kind generally found in the ſouthern parts of Ireland; but in the counties of Tyrone and Antrim ſome mines of ſlate-coal have been worked. Iron ore is very abundant; and before the foreſts were conſumed, there was a great number of iron works in various parts. Boate divides the iron mines of Ireland into three deſcriptions: 1. What he ſtyles the bog-mine, or, what is now termed lowland ore, found in moors and bogs; the ore reſembling yellow clay, but mouldering into a blackiſh ſand. 2. The rock mine; a bad ſort; the ore intimately combined with ſtone. 3. That found in various mountains; the ore ſpheric and of a whitiſh grey colour; balls of the beſt ore contained kernels full of ſmall holes, whence the name honey-comb ore. Boate praiſes this iron as frequently rivalling that of Spain; and Mr. Kirwan affirmed, before the houſe of commons, that the Arigna iron was better than any iron made from any ſingle ſpecies of ore in England. A defective ſupply of coal renders, however, the abundance of this ore of no avail. There are alſo valuable mines of lead, copper, and cobalt, ſome of which have been wrought to advantage; and gold has been found in the county of Wicklow, though not of ſuch conſequence as to promiſe much national advantage.

The bogs of Ireland form a very remarkable feature of the country. Theſe are of different kinds, and in ſome places are very extenſive. As trees, and even utenſils of different kinds have been found in theſe bogs, they are ſuppoſed not to be of very great antiquity; and the moſt probable account ſeems to be, that when foreſts had been cut down, the trees were ſuffered to lie on the ſpot, and the cultivation of the ground neglected. Theſe trees intercepted and confined ſtreams of water with the various rubbiſh they brought with them; and became gradually covered with a vegetation of moſs, ſedgy graſs, ruſhes, and various aquatic plants. Notwithſtanding attention was directed to the recovery of theſe extenſive waſtes more than a century ago, very little has yet been effected, which is rather to be attributed to want of proper exertion, than to ſuch recovery being impracticable. In the year 1809, however, on the recommendation of the Right Hon. John Foſter, at that time chancellor of the exchequer, who will be long remembered as a zealous promoter of the intereſts of Ireland, when party animoſity will be forgotten, com-

commiſſioners

miſſioners were appointed "to enquire into the nature and extent of the bogs of Ireland; and the practicability of draining and cultivating them." As the vaſt extent of theſe bogs has not enabled the commiſſioners to complete the taſk committed to them, it can only be obſerved, that the firſt of a number of diſtricts contains 36,430 Engliſh acres of bog, and that the expence of the operations which a very able engineer deemed neceſſary for completely draining it, was 70,014*l.* 7*s.* 3*d.* The bogs in the King's county alone, exceeding 500 acres each, contain at leaſt 124,000 acres. The drainage of theſe bogs is, therefore, a matter of vaſt importance, not only to Ireland, but to the empire at large, as theſe lands, now of little or no value, would, when drained and properly cultivated, yield a vaſt ſupply of food, for which England has had to pay large ſums in gold to her moſt bitter enemy. It has alſo been made evident, that this drainage would increaſe the quantity of turf fuel, ſo as to render it both more eaſily procurable and cheaper. At preſent only the ſmall bogs, which it is not intended to drain, and the edges of the large ones, are acceſſible to the turf-digger, but the drainage would enable an approach to the interior parts of them; and ſuch is the quantity, that after every exertion to reclaim, there will remain more for turf than an increaſed conſumption can poſſibly exhauſt in the courſe of ages. This is an obſervation of much importance, becauſe the want of this excellent fuel would be very ſeverely felt in a country where few coal mines are worked, and where the ſupply of coal is conſequently uncertain and expenſive. The inſtructions of the commiſſioners do not authoriſe them to examine the numerous boggy tracts on the ſides of mountains, which not being in general deep, afford at times good paſturage. The beſt mode of reclaiming theſe would be to introduce the culture of Fiorin, as recommended by the Rev. Dr. Richardſon, and thus render them good meadows.

Perhaps no country of the ſame extent is more bountifully watered by fine rivers and lakes, or more indented by noble harbours, than Ireland is, ſo as to poſſeſs, in an eminent degree, thoſe great requiſites for agriculture, manufactures, and the moſt extenſive commerce. The rivers, beſides abounding with an infinite variety of fiſh, communicate uncommon fertility to the lands which they beautify, and afford a multitude of the beſt ſituations for the machinery of manufactures, ſo that wind-mills are very rarely met with in this country. But though many of theſe rivers are very conſiderable in point of ſize, and run a pretty long courſe, and ſome of them are capable of bearing large boats many miles above their fall into the ſea; yet there are none which can be called navigable in the ſame ſenſe as the Thames or the Severn. This is partly occaſioned by rocks running acroſs their beds, and thus forming cataracts; partly by the practice of breaking down the banks to make fords for the convenience of travellers, when bridges were leſs frequent than they are at preſent; and partly by weirs made either to ſerve mills, or for the ſake of catching ſalmon. Much, however, may be done by labour, attention, and expence, to remove theſe impediments, and extend internal navigation; and ſo ſenſible was the Iriſh legiſlature of this, that a ſum of money has been appropriated, under the direction of commiſſioners, for this purpoſe. The Shannon is the principal river of Ireland, which, riſing in the northern part of Connaught, almoſt inſulates that province and the county of Clare, and after a courſe of 150 miles, in which it expands into ſix different lakes, it flows into the Atlantic ocean, between the counties of Clare and Kerry, being navigable for large veſſels as far as Limerick. The Suir, the Barrow, and the Nore, which Spenſer has deſcribed as three brothers, proceeding in different directions from Sliebhbloom, a ridge of mountains between the King's and Queen's counties, and in the north of Tipperary, pour their united ſtreams into the bay of Waterford.

The number of lakes or loughs in Ireland is very great, and ſome of them are large, and even magnificent. Many of thoſe ſheets of water, however, which are called by this name, are in reality arms of the ſea, as Lough-Swilly, Lough Foyle, and others. Of thoſe which are, ſtrictly ſpeaking, lakes, Lough Neagh, Lough Erne, and Lough Corrib, are the moſt conſiderable in point of extent; as Lough Lane, or the lake of Killarney, is the moſt diſtinguiſhed for its beauties. There are alſo many mineral ſprings in different parts, the moſt remarkable of which will be noticed under their reſpective counties.

The harbours of Ireland are very numerous. Theſe have been divided into the principal havens, and the leſſer or barred havens; but the diſtinction ſeems of little uſe, as they will deſerve notice, rather on account of their being frequented, than on account of natural advantages. Theſe indeed which are moſt capacious, on the S. and S.W. have hitherto been little frequented, except by the ſmuggler, or by veſſels unable to reach their deſtined port. Waterford and Cork harbours on the S.; Bantry and Dingle bays on the S.W.; the eſtuary of the Shannon, and the vaſt bay of Galway on the W.; that great opening on the N.W. of which the bay of Sligo is a part; Lough Swilly and Lough Foyle on the N., are the moſt conſiderable. On the eaſtern ſide, there are none poſſeſſed of great natural advantages, yet from the greater improvement of the adjoining country and the vicinity of England, there are many which are much frequented, eſpecially the harbours of Belfaſt and Newry, and the barred havens of Dublin, Drogheda, and Wexford. The principal commercial towns are Dublin, Cork, Belfaſt, Limerick, and Waterford.

With reſpect to the climate of Ireland, ſtrangers ſoon perceive that it is in general leſs hot in ſummer, and leſs cold in winter than in England, and other countries in the ſame latitude; and that very hot or very cold weather, when it does take place, continues for a much ſhorter time. If, however, the climate be more temperate, it is alſo much damper, both on account of a greater fall of rain, and of a moiſture in the atmoſphere when there is no rain, which produces a very ſtriking effect on the walls of houſes, on furniture, and various other articles. This prevalence of moiſture ſeems to be occaſioned by the winds blowing from the vaſt Atlantic ocean, and is more perceivable in the weſtern and ſouthern parts. Though the frequent ſhowers anſwer very well for paſturage, and clothe the limeſtone rocks with verdure, yet they often interfere with the gathering in of the harveſt, and render expedition on the part of the farmer, in uſing fine weather whilſt in his power, more neceſſary. This ſhort continuauce of heat is not ſufficient to ripen peaches, grapes, and other fruits, without great care and attention; but the broad-leaved myrtle (Myrtus communis) grows luxuriantly, with very little care, in the ſouthern counties, being ſeldom injured by the cold of winter; and the arbutus (Arbutus unedo) is not found as a native in any other country ſo far diſtant from the equator. Perſons advanced in life complain of an unfavourable change in the climate, ſaying that it is much ſeverer and more uncertain than it uſed to be; and an ingenious writer, Dr. W. Hamilton, (in the 6th vol. of Tranſactions of the Royal Iriſh Academy), has ſtated ſome facts which appear to add credibility to ſuch complaints. The pine-tree, eſpecially that ſpecies called the Scotch fir, formerly grew on many of the mountains of this iſland, and on parts of the northern and weſtern coaſts exceedingly bare and open to ſtorms. Vaſt roots and noble trunks of this ſpecies of pine have been ſeen, and examined with attention, in ſituations where human induſtry cannot now rear a twig of the hardieſt tree. The devaſtation occaſioned by ſands in ſome parts of the northern coaſt, and even in the ſouth, and the greater influxes of the tide, ſeem to prove the more frequent recurrence and greater violence of the Atlantic ſtorms. The deſtruction of the foreſts may perhaps account ſatisfactorily for ſome of theſe facts, whilſt others may have been occaſioned by circumſtances not yet ſufficiently attended to. Dr. Paterſon, in his "Obſervations on the Climate of Ireland," has adduced many facts to controvert the opinion of a change; and the obſervations made a century and a half ago, are ſo applicable to the country at preſent, that it may be inferred the preſent ſeaſons do not materially differ from former ones, and that the influence of the Atlantic has always been much the ſame. The winds moſt prevalent in Ireland are the weſt and ſouth-weſt, which, contrary to the poetical deſcription of zephyrs, are frequently attended with rain and ſtorms. Eaſterly winds are leſs common, and are generally dry and keen; theſe are found prejudicial to health, and invalids avoid being expoſed to them. On the whole, if the climate of Ireland be not the moſt agreeable, it is found very wholeſome; inſtances of longevity are frequent, and if peculiar circumſtances occaſion much ſickneſs in many of the large towns, the peaſantry are very healthful, and, in conſequence of it, robuſt and hardy. The bogs, which ſome have ſuppoſed to be unwholeſome, are of a very different nature from the moraſſes in other countries, which appears both from the timber preſerved in them, and from the effect produced on the ſkins of animals unfortunately loſt in them.

The productions of Ireland, and the animals found in it, do not differ much from thoſe in England. The moſt valuable ones in both ſeem to have been imported from other countries, and the variety of theſe muſt be greater in England, on account of its ſuperior cultivation. The domeſtic animals are the ſame, and from the care taken of late years to improve the breeds, it may be expected that our ſheep and oxen will not be ſurpaſſed. Bede, who has commemorated the praiſe of Ireland for abundance of honey and milk, alſo mentions numerous herds of deer, which animal the progreſs of cultivation has now rendered rare. In various parts of Ireland are dug up enormous horns of deer, which ſome writers have imagined to be of the ſpecies called mooſe deer in America; but Mr. Pennant has demonſtrated that the animal muſt have almoſt doubled in ſize the American monſter, which is ſometimes found ſeventeen hands in height. The Iriſh horns have been found of the extent of fourteen feet from tip to tip, furniſhed with brow antlers, and weighing 300 pounds; the whole ſkeleton is frequently found with them. It is ſuppoſed that the animal muſt have been about twelve feet high. Wolves infeſted the country formerly, but are ſaid to have been extirpated by Oliver Cromwell. It has been aſſerted that no poiſonous animal will live in Ireland, and even that no ſpiders will haunt Iriſh timber, which, as is ſaid, was the cauſe why it was often employed in magnificent ceilings in the middle ages. "Whether it be owing to the ſoil or the climate," ſays Dr. Beaufort, "certain it is that in Ireland there are neither moles nor toads, nor any kind of ſerpents; and it is not a hundred years ſince frogs, of which there are now abundance, were firſt imported from England. But though the ſame experiment has been made with ſnakes and vipers, it has happily been unſucceſsful." The rivers, lakes, and ſeas are ſtocked with a great variety of fiſh, which yield a plentiful article of food to all ranks of people. The fiſheries on the coaſt give employment to great numbers, and have become, in ſome inſtances, an object of national attention and legiſlative encouragement, though they have never yet been carried on as extenſively as they might be, or there could have been no occaſion for an importation of fiſh from foreign countries. Jephſon Oddy, eſq. in his proſpectus of a weſtern fiſhery company, mentions that the Nymph bank, and others near the coaſt of Ireland, abound with the fineſt cod, ling, hake, turbot, pollock, &c., and that the adjoining ſeas are frequented at different periods by mackarel and herrings in great quantities; and he forcibly urges that if this fiſhery was carried on with ſpirit, it would ſupply both England and Ireland with abundance of fiſh, ſo as to render importation unneceſſary, whilſt it would at the ſame time give employment to numbers, and prove a valuable nurſery for ſeamen.

The native graſſes are thoſe eſteemed moſt valuable by the farmer, ſo that Ireland has ever been celebrated for the excellence of its paſtures; the number of cultivated vegetables is daily increaſing; and in conſequence of the attention lately paid to botanical knowledge, it appears that native plants have not been beſtowed with a ſparing hand. The introduction of the potatoe, the value of which is univerſally acknowledged, and which forms the principal part of the food of the Iriſh peaſantry, has been commonly attributed to ſir Walter Raleigh.

To this general and brief account of the natural ſtate of Ireland, it may be proper to ſubjoin a liſt of the counties into which Ireland is divided. The population of each, as ſtated by Dr. Beaufort, is added; at the ſame time it muſt be obſerved, that this moſt probably falls far ſhort of the real population, as in ſo many years as have elapſed ſince its publication, there muſt have been a conſiderable increaſe. It may ſerve, however, to give ſome idea of the comparative population of different counties, until more ſatisfactory documents than at preſent exiſt enable us to give a more correct ſtatement. The number of counties is 32, which are contained in four provinces. A particular account of each will be found under their reſpective names.

ULSTER.

County.	Shire Town.	Population.
Antrim	Carrickfergus	160,000
Down	Downpatrick	201,500
Armagh	Armagh	120,000
Tyrone	Omagh	158,000
Londonderry	Londonderry	125,000
Donegal	Liſſord	140,000
Fermanagh	Enniſkillen	71,800
Cavan	Cavan	81,570
Monaghan	Monaghan	118,000

LEINSTER.

County.	Shire Town.	Population.
Louth	Dundalk	57,750
Meath	Trim	112,400
Weſtmeath	Mullingar	69,000
Longford	Longford	50,100
King's county	Philipſtown	74,500
Queen's county	Maryborough	82,000
Kildare	Naas	56,000
Dublin	Dublin	198,000
Wicklow	Wicklow	58,000
Wexford	Wexford	115,000
Carlow	Carlow	44 000
Kilkenny	Kilkenny	100,000

CONNAUGHT.

Sligo	Sligo	60,000
Leitrim	Carrick on Shannon	50,000
Roſcommon	Roſcommon	86,000
Mayo	Caſtlebar	140,000
Galway	Galway	142,000

MUNSTER.

Clare	Ennis	96,000
Limerick	Limerick	170,000
Kerry	Tralee	107,000
Cork	Cork	416,000
Tipperary	Clonmell	169,000
Waterford	Waterford	110,000

Mr. Pinkerton is of opinion that Ireland was early diſcovered by the Phœnicians. "On the firſt dawn of hiſtory," ſays he, "and when the north-weſt of Europe was as obſcure to the Greeks, as the iſlands on the north-eaſt of Siberia were recently to us, it would ſeem that Ireland conſtituted one of the Caſſiterides. The poems aſcribed to Orpheus deſerve no credit, but it appears that the iſland was known to the Greeks by the name of Juveona, about two centuries before the birth of Chriſt. When Cæſar made his expedition into Britain, he deſcribes Hibernia as being about half the ſize of the iſland which he had explored; and while the Romans maintained their conqueſts in the latter region, Ireland continued, of courſe, to be well known to them, and Ptolemy has given a map of the iſland, which is ſuperior, in accuracy, to that which repreſents Scotland. Towards the decline of the weſtern empire, as the country had become more and more known, and had been peopled with various tribes, the Romans diſcovered that the ruling people in Ireland were the Scoti; and thenceforth the country began to be called *Scotia,* an appellation retained by the monaſtic writers till the eleventh century, when the name Scotia having paſſed to modern Scotland, the ancient name of Hibernia began to re-aſſume its honours. It is ſuppoſed that this name, and the Gothic denomination Ireland, are mere modifications of the native term *Erin,* implying the country of the weſt."

"It is probable," ſays the ſame writer, whoſe attention to the ſubject of antiquities gives great weight to his opinion, "that the original population of Ireland paſſed from Gaul, and was afterwards increaſed by their brethren the Guydil from England. About the time that the Belgæ ſeized on the ſouth of England, it appears that kindred Gothic tribes paſſed to the ſouth of Ireland. Theſe are the Firbolg of the Iriſh traditions; and appear to have been the ſame people whom the Romans denominated Scoti, after they had emerged to their notice by not only extending their conqueſts to the north and eaſt in Ireland, but had begun to make maritime excurſions againſt the Roman provinces in Britain. But Ireland had been ſo much crowded with Celtic tribes, expelled from the continent and Britain by the progreſs of the German Goths, that the Belgæ almoſt loſt their native ſpeech and diſtinct character; and from intermarriage, &c. became little diſtinguiſhable from the original population, except by ſuperior ferocity, for which the Scoti, or thoſe who affected a deſcent from the Gothic colonies, were remarkable; while the original Gael ſeem to have been an innocuous people." Such is Mr. Pinkerton's account of the early ſtate of Ireland, but as very different ones have been given reſpecting this, and as it ſtill continues to be a ſubject of controverſy, it will be proper to give a brief abſtract of the principal opinions, and the authority on which they reſt. The celebrated Edmund Spenſer, in his "View of the State of Ireland," ſuppoſes it to have been firſt peopled by the Scythians, from whom the name Scotia was derived. Theſe ſettled in Ulſter, and a colony from them went to Scotland. Another nation came out of Spain to the weſt part of Ireland, and finding it waſte, or weakly inhabited, poſſeſſed it. Theſe he ſuppoſed to have been Gauls, who had learned letters in Spain, where they were introduced by the Phœnicians, and brought them to Ireland, where it is certain they were known at a very early period. From the Scythians, Spenſer ſuppoſes the Iriſh to have derived, 1ſt, the cuſtom of keeping their cattle, and living themſelves, for the moſt part of the year, in *boolies* or hordes, paſturing upon the mountains and waſte wild places; and removing ſtill to freſh land, as they had depaſtured the former. This cuſtom, which ſeems to have continued to Spenſer's time, was very injurious. The boolies were receptacles for outlaws and looſe people, who there evaded juſtice; and thoſe who lived in them grew more barbarous, and lived more licentiouſly than they could in towns, uſing what manners they liſted, and practiſing what miſchiefs and villanies they would either againſt the government, or private individuals. Another Scythian cuſtom was the wearing of mantles, and long glibbes, which is a thick curled buſh of hair, hanging down over their eyes, and monſtrouſly diſguiſing them. Theſe mantles Spenſer deſcribes as convenient for outlaws, rebels, and thieves. As the paſſage is curious, and the work leſs known than it ought to be, the inſertion of it may afford ſome entertainment to the reader. "Firſt the outlaw being for his many crimes and villanies baniſhed from the townes and houſes of honeſt men, and wandering in waſte places, far from danger of law, maketh his mantle his houſe, and under it covereth himſelfe from the wrath of heaven, from the offence of the earth, and from the ſight of men. When it raineth, it is his pent-houſe; when it bloweth, it is his tent; when it freezeth, it is his tabernacle. In ſommer he can wear it looſe; in winter he can wrap it cloſe; at all times he can uſe it; never heavy, never cumberſome. Likewiſe for a rebell it is as ſerviceable. For in his warre that he maketh (if at leaſt it deſerve the name of warre) when he ſtill flyeth from his foe, and lurketh in the thick woods and ſtraite paſſages, waiting for advantages, it is his bed, yea, and almoſt his houſhold ſtuff. For the wood is his houſe againſt all weathers, and his mantle is his couch to ſleep in. Therein he wrappeth himſelfe round, and coucheth himſelfe ſtrongly againſt the gnats, which in that country doe more annoy the naked rebells, whilſt they keepe the woods, and doe more ſharply wound them than all their enemies ſwords, or ſpears, which can ſeldome come nigh them; yea, and oftentimes their mantle ſerveth them, when they are neare driven, being wrapped about their left arme, inſtead of a target, for it is hard to cut thorough with a ſword, beſides it is light to beare, light to throw away, and being (as they commonly are) naked, it is to them all in all. Laſtly, for a thiefe it is ſo handſome, as it may ſeem it was firſt invented for him, for under it he may cleanly convey any fit pillage that commeth handſomly in his way, and when he goeth abroad in the night in free-booting, it is his beſt and ſureſt friend; for lying, as they often doe, two or three nights together abroad to watch for their booty, with that they can prettily ſhroud themſelves under a buſh, or a bank ſide, till they may conveniently doe their errand; and when all is over, he can, in his mantle, paſſe thorough any town or company, being cloſe hooded over his head, as he uſeth, from knowledge of any to whom he is indangered. Beſides this, he, or any man els that is diſpoſed to miſchiefe or villany, may under his mantle goe privily armed without ſuſpicion of any, carry his head-peece, his ſkean or piſtol if he pleaſe, to be alwayes in readineſs." In like manner he conſiders the long hair or glibbe as ſerving the purpoſe of concealment. The Iriſh cry, or *hubub* as he calls it, which the kerne or ſoldiery uſe at their firſt encounter, he alſo conſiders of Scythian origin; and alſo the calling upon the name of ſome chieftain, as *Ferragh* for inſtance, which he ſuppoſes to be the name of a chief under whom they fought ſucceſsfully againſt the Africans. To this he adds their lamentations at their burials, "with diſpairful out-cryes and immoderate waylings," which ſavour greatly of the Scythian barbariſm. Our ingenious author next proceeds to ſhew that the Iriſh arms and weapons are Scythian, and the ſame alſo as thoſe uſed by the old Scots, who were of the ſame ſtock; that the Iriſh reſembled the Scythians in their confuſed kind of march without order or array; and alſo in certain religious ceremonies. From all theſe circumſtances he infers that the Iriſh are anciently deduced from the Scythians. He afterwards adduces cuſtoms derived from the Spaniards and Gauls in proof of colonies of them having been eſtabliſhed in Ireland, but they are fewer in number and leſs remarkable. The uſe of ſaffron ſhirts, the giving the charge of all houſhold affairs at home and abroad to their women, the manner in which theſe ſat on horſe-back, with a few others, are ſtated as of Spaniſh origin; whilſt the uſe of long darts and wicker ſhields is mentioned as derived from the Gauls. Such is Spenſer's opinion reſpecting the origin of the Iriſh, founded, as may be ſeen, on conjectures, for the inferences drawn from cuſtoms can ſcarcely deſerve any other name. The colony from Spain, which he admits, though he ſpeaks doubtfully of the origin of the people, and gives no particulars, is laid great ſtreſs on by the advocates for the ancient glory of Ireland. "Not to ſpeak of the original ſettlement by Partholan," ſays Dr. Leland, "it is maintained that about 500 years before the Chriſtian era, a colony of Scythians, immediately from Spain, ſettled in Ireland, and introduced the Phœnician language and letters into this country; and that however it might have been peopled ſtill earlier, yet Heber, Heremon, and Ith, the ſons of Mileſius, gave a race of kings to the Iriſh, diſtinguiſhed from their days by the names of Gadelians and Scuits or Scots. Hence their writers trace a gradual refinement of their country from a ſtate of barbarous feuds, factions, and competitions; until the monarch, celebrated in their annals by the name of Ollam-Fodla, eſtabliſhed a regular form of government, erected a grand ſeminary of learning, and inſtituted the *Fes*, or triennial convention of provincial kings, prieſts, and poets, at Teamor or Tarch, in Meath, for the eſtabliſhment of laws and regulation of government. Keating, the Iriſh hiſtorian, who tranſcribed his accounts from poetical records, mentions little more of this boaſted aſſembly, than that its great object was to introduce civility, and to guard againſt thoſe crimes which predominate in days of rudeneſs and violence. The magnificent detail of its grandeur and ſolemnity, the ſcrupulous attention paid by its members to the national hiſtory, annals, and genealogies, are nothing more (as I am aſſured) than the interpolations of an ignorant and preſumptuous tranſlator. But whatever were the inſtitutions of this monarch, it is acknowledged that they ſoon proved too weak for the wildneſs and diſorder of the time. To Kimbath, one of his ſucceſſors, the annaliſts give the honour of reviving them; beſides that of regulating Ulſter, his family province, and adorning it by the ſtately palace of Eamania, erected near Armagh." One of his ſucceſſors, to ſecure his power, divided the iſland into twenty-five dynaſties, inſtead of five; but the pentarchal government was reſtored about a century before the Chriſtian era. Anarchy, ſedition, and murder continued prevalent, notwithſtanding the wiſe laws occaſionally enacted; and an Iriſh chieftain is ſaid to have addreſſed himſelf to Agricola, and to have encouraged him to make a deſcent on Ireland. Theſe, however, who warmly contend for the honour of Ireland, ſay that ſuch deſcent would not have been effectual; and record with triumph that the Iriſh monarch of this time, inſtead of dreading an invaſion of the Romans, ſailed to the aſſiſtance of the Picts, led an irruption into the Roman province, and returned in triumph laden with foreign ſpoils. After this, the old Firbolgs or Belgic inhabitants grew ſo powerful and turbulent as to eſtabliſh a monarch of their own race, and to haraſs the country by what was called the Attacotic war. Tuathel, a Mileſian prince, reſtored the power of his family; and in the time of his grandſon, in the third century, Finn, the ſon of Comhal, better known by the name of Fingal, is ſaid to have lived, and to have been general of his troops. The ſucceſſion of kings of the Mileſian family, to the year 1198, is ſaid to have been 171.

General Vallancey, who has paid very great attention to the antiquities of Ireland, and whoſe great learning and perſonal reſpectability, as well as his exertions for the good of ſociety, ſhould ſecure him from petulant and wanton abuſe, has, in his "Vindication of the ancient Hiſtory of Ireland," maintained the truth of the leading facts mentioned by Keating and others. The Scythians, by whom the country was peopled, were, according to him, not the Northern, but Southern Scythians, the ſame people as the Phœnicians, who are to be diſtinguiſhed from the Canaanites, and were the navigators of the latter, acknowledged as ſubjects, but never admitted to a ſhare in the government, or to the rank of nobleſſe. They had the uſe of letters, a knowledge of aſtronomy, of marine aſtronomy in particular, and of navigation; but had no knowledge of the fine arts, their religion forbidding it. Theſe Phœnicians are ſuppoſed to have been originally Perſians or Indians, proceeding from that eaſtern diſtrict, the ſuppoſed ſource of all civilization; and the late writers on Indian antiquities produce many circumſtances tending to eſtabliſh a knowledge of Ireland in that oriental people, and an intercourſe with it at a very early period. It would occupy more room than the nature of a Cyclopædia would allow, to enter upon the arguments adduced by the learned general in ſupport of his opinions. Suffice it to ſay, that they chiefly reſt on the etymology of names, on a reſemblance in certain words, and on a reſemblance alſo in certain religious ceremonies and old cuſtoms, which are thought to have originated in fire-worſhip, which is ſuppoſed to have been once prevalent throughout Ireland. The Rev. Dr. Ledwich, author of an elaborate work on the "Antiquities of Ireland," endeavours, with all the eagerneſs of a partizan, to expoſe and ridicule all pretenſions to early civilization. He contends that Ireland was firſt peopled from Great Britain by the Celts, who were wandering ſavages, of whom little is recorded, and that little proclaims their ignorance and barbariſm. The Belgæ and other northern tribes afterwards ſettled in it; and it had at no time arrived to a greater degree of improvement than when viſited by the Engliſh under Henry II. To be qualified to form an opinion on the preceding ſubject would require a long courſe of ſtudy, the acquiſition of languages of little uſe except to the antiquary, and the peruſal of many volumes in the higheſt degree dry and unintereſting; and after all, ſuch is the want of written documents of an early date, that the moſt we could arrive at would be probable conjecture. At the ſame time, it does not appear improbable, much leſs abſurd to ſuppoſe, that the Phœnicians might have colonized Ireland at an early period, and introduced their laws, cuſtoms, and knowledge, with a comparatively high ſtate of civilization; and that theſe might have been gradually loſt amidſt the diſturbances of the country, and at laſt completely deſtroyed by the irruptions of the Oſtmen, ſo as to have reduced Ireland to a barbarous ſtate, previous to the Engliſh invaſion.

The converſion of Ireland to Chriſtianity is generally attributed to Patrick, who has been called the "tutelar ſaint of Ireland." He is ſaid to have landed in Ireland A.D. 430. The people were, however, prepared for his preaching by the labours of ſome former miſſionaries. Notwithſtanding the introduction of Chriſtianity, the petty princes and people retained their ferocity of manners; and the annals abound in horrid inſtances of revenge, and hideous effects of avarice and ambition. "Yet Chriſtianity, as then taught," ſays Dr. Leland, "although it could not eradicate, at leaſt reſtrained the national vices. A numerous body of eccleſiaſtics, ſecular and regular, quickly ſwarmed over the whole country; frequently became umpires between contending chieftains; and when they could not confine them within the bounds of reaſon and religion, at leaſt terrified them by denouncing vengeance againſt their exceſſes. An ignorant people liſtened to their tales of pretended miracles with a religious horror. In the midſt of every provincial conteſt, and every domeſtic ſtrife, they were ſacred and inviolate. They ſoon learned to derive their own emolument from the public veneration. The infant church was every where amply endowed, and the prayers of holy men repaid by large donations. Some of the oldeſt remains of Iriſh literature, as they have been explained to me, inform us, that the people were taught to dedicate the firſt-born of all cattle to the church, as a matter of indiſpenſible obligation. But if the clergy thus acquired riches, they applied them to the nobleſt purpoſes. The monks, ſays Mr. O'Connor, fixed their habitations in deſerts, which they cultivated with their own hands, and rendered the moſt delightful ſpots in the kingdom. Theſe deſerts became cities; and it is remarkable enough, that to the monks we owe ſo uſeful an inſtitution in Ireland, as bringing great numbers together into one civil community. In theſe cities the monks ſet up ſchools, in which they educated the youth, not only of the iſland, but of the neighbouring nations. The teſtimony of Bede is unqueſtionable, that about the middle of the ſeventh century, in the days of the venerable prelates Finian and Colman, many nobles and other orders of the Anglo-Saxons retired from their own country into Ireland, either for inſtruction, or for an opportunity of living in monaſteries of ſtricter diſcipline; and that the Scots (as he ſtyles the Iriſh) maintained them, taught them, and furniſhed them with books, without fee or reward:—a moſt honourable teſtimony, ſays the elegant lord Lyttelton, not only to the learning, but likewiſe to the hoſpitality and bounty of that nation! A conflux of foreigners to a retired iſland, at a time when Europe was in ignorance and confuſion, gave peculiar luſtre to this ſeat of learning: nor is it improbable or ſurpriſing that ſeven thouſand ſtudents ſtudied at Armagh, agreeably to the accounts of Iriſh writers; though the ſeminary of Armagh was but one of thoſe numerous colleges erected in Ireland. But the labours of the Iriſh clergy were not confined to their own country. Their miſſionaries were ſent to the continent. They converted heathens; they confirmed believers; they erected convents; they eſtabliſhed ſchools of learning; they taught the uſe of letters to the Saxons and Normans; they converted the Picts, by the preaching of Columb-kill, one of their renowned eccleſiaſtics. Burgundy, Germany, and other countries received their inſtructions: and Europe with gratitude confeſſed the ſuperior knowledge, the piety, the zeal, the purity of the "Iſland of Saints." Such are the events on which Iriſh writers dwell with an enthuſiaſtic delight. The firſt Chriſtian miſſionaries ſeem to have induſtriouſly avoided all unneceſſary violence to the ancient manners of the Iriſh. Their poets they favoured and protected; the remains of the Druidical order were not perſecuted; and although divine vengeance was thundered againſt the worſhippers of the ſun, ſtars, and winds, it is evident that ſome Pagan ſuperſtitions were overlooked with too great indulgence, for they ſubſiſt at this day in Ireland: fires are lighted up at particular times, and the more ignorant Iriſh ſtill drive their cattle through thoſe fires, as an effectual means of preſerving them from future accidents." Such is the abſtract given by Leland, in his preliminary diſcourſe of the introduction and eſtabliſhment of Chriſtianity. Dr. Ledwich, however, not only gives a different account of theſe, but even calls in queſtion the exiſtence of St. Patrick, regarding him as an ideal perſonage. He ſuppoſes, and with great appearance of reaſon, that Chriſtianity, which had been brought to Gaul by Pothinus and Irenæus, diſciples of Polycarp, who had been himſelf inſtructed by John the Evangeliſt, from Gaul reached Britain, and from Britain was carried to Ireland, in the third or fourth century, as early as the ſuppoſed time of St. Patrick, or even earlier. It ſeems a ſtrong circumſtance in favour of this opinion, that the Iriſh Chriſtians, or the Saxons converted by them, did not acknowledge the Roman pontiff till long after the reſt of the Chriſtian world; which would not have been the caſe, had their inſtruction proceeded from one ſent immediately from Rome to convert them, as Patrick is ſaid to have been. If ſuch a perſon as Patrick really preached Chriſtianity in Ireland, it ſeems at leaſt to be certain that not only the miracles aſſigned to him are monkiſh inventions, but that his epiſcopal dignity, and many other circumſtances recorded, are without foundation. Columba appears to have been the founder of the Iriſh monaſteries; and, like the Scotch, the Culdee ſect was prevalent amongſt them, and was not completely overthrown until pope Adrian, in the plenitude of his preſumption, beſtowed Ireland on Henry II. in 1155. See CULDEES.

Ireland was divided into five ſeparate kingdoms, and in each of theſe were powerful and factious dynaſties. All indeed acknowledged one monarch, but his power was remarkably weakened; and if the people were not wretched, it was becauſe the evils of their political conſtitution were in ſome meaſure corrected by the reverence paid to religion and learning. As the armies collected by ſuch governments are temporary, they are ill calculated for reſiſting a foreign invaſion; and ſuch was found to be the caſe in Ireland. Bede mentions, that, in 684, the general of Egfrid, king of Northumberland, made a deſcent on Ireland. But inſtead of mentioning any gallant reſiſtance made by the natives, he inſinuates that they truſted more to prayers than arms; and in the plaintive ſtyle of compaſſion laments the miſerable havock of a people, inoffenſive, and ever moſt friendly to the Engliſh. But Ireland experienced a ſtill more formidable invaſion, when the Danes, Norwegians, and other Scandinavian adventurers began to rove in ſearch of new ſettlements. Theſe were called Normans, Eſterlings, or Oſtmen, and alſo Gal's or foreigners. Their piratical expeditions commenced about the end of the eighth century, and whilſt they infeſted England and France, Ireland did not eſcape. Their firſt invaſions were made in ſmall parties for the ſake of plunder, and were frequently repulſed. By degrees the invaders, either by force or treaty, obtained ſome ſmall ſettlements; and at length Turgeſius, a warlike Norwegian, in 815, landed with a powerful armament, and committed every kind of outrage. Having reduced the inhabitants to ſlavery, after a reſidence of 30 years, he was proclaimed monarch of the kingdom; but at length Melachlin, prince of Meath, contrived to ſeize upon the tyrant in a time of apparent peace, and the Danes, ſurpriſed by a ſudden inſurrection, were maſſacred or diſperſed. A new colony, however, arrived, and were allowed to ſettle in ſome maritime towns. Theſe gradually ſtrengthened themſelves, and maintained their independence, though frequently engaged in wars with the Iriſh princes, and repeatedly overcome in battle. The moſt celebrated of theſe engagements was at Clontarf, near Dublin, in 1012, when the Iriſh were ſucceſsful, but loſt their monarch, Brian Boiromhe, at the age of 88, and his ſon Morchard. After this event Ireland continued to be diſtracted by civil wars, and the ſituation of the people was as wretched as can almoſt be conceived; ſo that the iſland was rendered an eaſy prey to any daring invader.

It has been already noticed that the clergy of Ireland were of the Culdee ſect, by which the Roman pontiff was not acknowledged. This is indeed matter of controverſy; but it ſeems indubitable that they were very irregular, and that it was an object with the pope to bring them to obedience. The pontificate, however, by the intereſted zeal of its numerous and active emiſſaries, at length contrived to extend its influence even to this remote iſland, alarmed the Iriſh clergy with fears of the irregularity of their eccleſiaſtical conſtitution, and perſuaded them to ſubmit to a reform, modelled and dictated by Rome. Cardinal Papire, or Papeſon, came to Ireland as legate in 1148; and in 1151, or 1152, ſummoned a council, which was attended by about 3000 eccleſiaſtics, and four palls were ſolemnly received from the pope by the prelates of Armagh, Dublin, Caſhel, and Tuam. At the ſame time, it is ſaid that the celebration of Eaſter was adjuſted according to the Romiſh deciſions, the celibacy of the clergy was enforced, and the pre-eminence of Rome formally acknowledged. Whether Adrian, at that time pope, did not think this ſubmiſſion of the Iriſh clergy ſufficiently eſtabliſhed, or, as an Engliſhman, was willing to gratify the Engliſh monarch, though at the expence of his newly-acquired dependents, he iſſued a bull in 1155 conformable to the wiſhes and purpoſes of Henry, who, at the very commencement of his reign, meditated the ſubjugation of Ireland, and ſent his chaplain to ſolicit the pope's countenance. For ſuch an invaſion no juſt pretence could be aſſigned. Ireland was entirely independent; and, though aſſiſtance had been afforded in a former reign to the ſons of Harold, yet there had been for many years nothing which could be reckoned hoſtile. It was aſſerted, indeed, that Engliſhmen had been ſold as ſlaves in Ireland; but this was a crime in which both nations were equally involved, and which, therefore, could not be urged to juſtify ſuch an attempt. The depravity and barbariſm of the Iriſh were, however, inſiſted on; the honour of God was to be promoted by their ſubjugation; and the pope was to receive the tribute of St. Peter's pence as the reward of his compliance. A bull was accordingly iſſued, which, as Leland obſerves, affords a ſhocking inſtance of the profligacy and impiety of papal uſurpation. Much has been ſaid of the depraved ſtate of the Iriſh at this period; but the accounts proceed from a very ſuſpicious ſource, thoſe whoſe object it was to defend the proceedings of the Engliſh monarch; and it may be queſtioned whether they were really worſe than their neighbours, or ſo bad as thoſe who have thus ſtigmatiſed them. But whatever their moral defects might be, their political ones were very great; they were truly a divided people. A monarch, little more than titular, depending on his own abilities and vigour for power and influence, was haraſſed by faction, and oppoſed by powerful rivals; whilſt a number of provincial chieftains, who aſſumed the title and the rights of royalty, paid a precarious tribute to their ſuperior, and united, if they were diſpoſed to unite with him, as allies rather than ſubjects. This was in a great degree the ſtate of France and ſome other countries; but in Ireland the monarchical dignity was not hereditary, and was the ſubject of frequent diſpute. Favourable as ſuch a ſtate was to the wiſhes of Henry, yet it was long before he could avail himſelf of the bull he had received. In France and England he found full employment for many years; and ſcarcely had he ſecured his dominions before he was involved in that conteſt with Becket, which kept him in a continual ſtate of agitation. The circumſtance which led to the accompliſhment of his deſign, was the expulſion of Dermod, king of Leinſter, from his dominions, and that prince's taking refuge in England. Dermod, a man of a turbulent and oppreſſive ſpirit, had, by his conduct, provoked the vengeance of Roderic O'Connor, the monarch of Ireland, whilſt his own immediate dependants deſerted him in the hour of his diſtreſs. He applied to Henry for aſſiſtance to recover his dominions; but, whether from the perplexity of his own affairs, or, as ſir John Davies ſuppoſes, a wiſh to avoid the expence, this monarch did not undertake the cauſe, but gave licenſe, by his letters patent, that ſuch of his ſubjects might paſs over into Ireland as would at their own charge become adventurers in that enterpriſe. Notwithſtanding this permiſſion, he did not for ſome months ſucceed in obtaining ſuccour; but at length he prevailed on Richard, earl of Pembroke, generally called Strongbow, to eſpouſe his cauſe, promiſing him his daughter Eva in marriage, and with her the inheritance of his kingdom. And on his return to Ireland, to prepare for Strongbow's arrival, he engaged two Welſh leaders, Fitzſtephen and Fitzgerald, with their followers, on the condition of ceding to them the town of Wexford, with a large adjoining territory, as ſoon, as by their aſſiſtance, he could be re-inſtated in his rights. The invaſion of Ireland was therefore the act of private adventurers. Fitzſtephen and Fitzgerald firſt broke the ice with a party of 390 men in 1170. The earl Strongbow followed them with 1200 more; and their good ſucceſs on the ſea coaſts of Leinſter and Munſter drew over the king in perſon, who landed at Waterford in 1172, with 500 knights and about 4000 ſoldiers. Strongbow immediately ſurrendered to him the city of Waterford, and did homage to him for the principality of Leinſter, which he claimed in right of his wife, the daughter of Dermod, whoſe death had taken place in the preceding year. The neighbouring Iriſh princes in like manner ſubmitted, and acknowledged his authority; and even Roderic, after ſome delay, thought it more prudent to follow their example. Henry aſſumed the title of lord of Ireland, but his authority was very weak; and, within five months after his arrival, he departed out of Ireland without ſtriking one blow, or building one caſtle, or planting one garriſon among the Iriſh. Such was the conqueſt of Ireland by Henry II.; which, as it was unjuſtifiable, ſo was it inefficient. As ſir John Davis obſerves, "though king Henry II. had the title of ſovereign and lord over the Iriſh, yet did he not put thoſe things in execution which are the true marks of ſovereignty. For, to give laws unto a people; to inſtitute magiſtrates and officers over them; to puniſh and pardon malefactors; to have the ſole authority of making war and peace, and the like, are true marks of ſovereignty, which king Henry II. had not in the Iriſh countries; but the Iriſh lords did ſtill retain all theſe prerogatives to themſelves: for they governed their people by the Brehon law; they made their own magiſtrates and officers; they pardoned and puniſhed all malefactors within their ſeveral countries; they made war and peace one with another without controlment; and this they did, not only during the reign of Henry II. but afterwards, in all times, even until the reign of queen Elizabeth." In fact, the Iriſh only acknowledged the ſuperiority of Henry in the ſame way as the Welſh princes often did before their ſubjection; and in the ſame way as Henry himſelf did homage to the king of France, as his liege lord for the vaſt territories he held in France. Henry himſelf, in the treaty of agreement made in 1175, acknowledged Roderic as king of Connaught, and in his commiſſion to William Fitz-Adeline gave the Iriſh lords the title and ſtyle of kings. It is unneceſſary to enter into a detail of the petty wars between the Engliſh ſettlers and Iriſh chieftains, or of the jealouſy entertained of the former by their ſovereigns, who, though prevented by family diſtreſſes from going over, ſent agents to watch and check them. Had Ireland been at this time ſubdued by a competent force, and the Engliſh laws introduced into every part of it, it would have contributed to the quiet and happineſs of all claſſes; but as it was, the Engliſh ſettlers added to the confuſion. Their only object appears to have been to acquire territories for themſelves; and few croſſed to Ireland except rude and barbarous warriors, little, if at all, ſuperior to thoſe amongſt whom they went. In 1185, Henry ſent John, his youngeſt ſon, whom he had previouſly made lord of Ireland, to that country. This young prince, being but 12 years of age, with a train of young noblemen and gentlemen to the number of 300, but not with any conſiderable army, arrived at Waterford, and was attended there by the Iriſh chieftains, who, diſunited among themſelves, and terrified by the repreſentations of his force, flocked to Waterford to pay their reſpects and do homage. But the youthful courtiers about the prince were not calculated to conciliate; they treated their viſitors with the utmoſt ſcorn and contempt, and ſo highly rouſed their indignation as to produce a general ſpirit of reſiſtance. The original ſettlers, too, were ill uſed, and the Engliſh intereſt was with great difficulty maintained in the towns which they had fortified. Henry found it neceſſary to recal his ſon, and the government of Ireland was committed to John de Courcy, a valiant knight, who had already acquired conſiderable poſſeſſions in Ulſter. "From this time forward," ſays that judicious writer ſir John Davies, "until the 12th year of king John, (which was a ſpace of more than 30 years,) there was no army tranſmitted out of England to finiſh the conqueſt. Howbeit, in the mean time, the Engliſh adventurers and colonies already planted in Ireland did win much ground upon the Iriſh; namely, the earl Strongbow, having married the daughter of Mac Morrogh in Leinſter; the Lucies in Meath; the Giraldians and other adventurers in Munſter; the Audelies, Gernons, Clintons, Ruſſels, and other volunteers of ſir John de Courcy's retinue in Ulſter; and the Bourkes (planted by William Fitz-Adeline) in Connaught. Yet were the Engliſh reputed but part owners of Ireland at this time, as appears by the commiſſion of the pope's legate in the time of king Richard I., whereby he had power to exerciſe his juriſdiction in England, Wales, and *thoſe parts of Ireland* in which John earl of Morton has power and dominion, as it is recorded by Matthew Paris." During this interval, not only the Iriſh chieftains frequently revolted, but ſome of the great Engliſh ſettlers aſſumed independence. This was particularly the caſe after the acceſſion of John to the Engliſh throne, and the ſuppreſſion of one of theſe was the avowed object of his viſit to Ireland in the year 1210. He brought with him a conſiderable force, though not perhaps ſufficient for the complete reduction of the iſland, even if he had remained a ſufficient time to perform ſo great an action. This, however, he did not, for he arrived in June and returned in September the ſame year. The Iriſh lords, for the moſt part, ſubmitted themſelves to him, as they had done before to his father; "which," ſays ſir John Davies, "was but a mere mockery and impoſture: for his back was no ſooner turned, but they returned to their former rebellion: and yet this was reputed a ſecond conqueſt." At this time twelve counties were eſtabliſhed in Leinſter and Munſter, and ſheriffs appointed for them, and courts of judicature were alſo ſettled in Dublin, for the regular and effectual execution of the laws of England in that part of the iſland which acknowledged allegiance to the crown. Some caſtles were built upon the borders of the Engliſh colonies, but the king carrying back with him the army he had brought, the former ſettlers were left to defend their poſſeſſions, and increaſe them in the beſt manner they were able.

The long and turbulent reign of Henry III. was diſtinguiſhed by no remarkable change in the ſtate of Ireland. The families of Burgh and Fitzgerald received a large acceſſion of power and territory, and the clergy, though themſelves oppreſſed both by the king and the pope, were not deficient in turbulence and preſumption. Edward I. an active monarch, was too much engaged in regulating the diſordered ſtate of England, and in reducing Wales and Scotland, to devote much attention to the affairs of Ireland. At the commencement of his reign, the Engliſh ſettlers experienced ſome heavy loſſes, and were nearly expelled from their ſouthern poſſeſſions, but the Iriſh were not united, and the advantages gained in one year were often loſt the next, through the diſſentions of the conquerors. Many of the Iriſh were at this time anxious to ſhare the protection of the Engliſh laws, for, to the diſgrace of the Engliſh government, this advantage had been withheld, and whilſt the murder of an Engliſhman by one of the *mere Iriſh*, as they were termed, was avenged with the utmoſt rigour, the murder of an Iriſhman was ſcarcely deemed a puniſhable offence. An application was made early in this reign to Ufford, the chief governor, offering the king 8000 marks, provided he would grant the free enjoyment of the laws of England to the Iriſh inhabitants. The petitioners muſt have been the Iriſh reſiding within what was called the "Engliſh pale," for the reſt were ſo much attached to their own Brehon laws, as to be adverſe to a change at a much later period; though it is probable that if the wiſe policy of aſſimilating *all* the inhabitants had been now adopted, the objection to it would have been leſs, than at the time it was actually attempted. The king was well inclined to comply with the requeſt of the petitioners, but this did not ſuit thoſe, whoſe violence and oppreſſion would have been thus controlled, and whoſe influence was great enough to counteract the intended meaſure. Individuals, however, of the Iriſh race ſued for, and obtained charters of denization, particularly on their intermarriage with the Engliſh. That ſuch conduct irritated the old inhabitants cannot be ſurpriſing. "As long as they (the Iriſh) were out of the protection of the law," ſays ſir John Davies, "ſo as every Engliſhman might oppreſs, ſpoil, and kill them without controlment, how was it poſſible they ſhould be other than outlaws, and enemies to the crown of England? If the king would not admit them to the condition of ſubjects, how could they learn to acknowledge and obey him as their ſovereign? When they might not converſe or commerce with any civil men, nor enter into any town or city without peril of their lives, whither ſhould they fly but into the woods and mountains, and there live in a wild and barbarous manner? If the Engliſh magiſtrates would not rule them by the law which doth puniſh murder, and treaſon, and theft with death, but leave them to be ruled by their own lords and laws, why ſhould they not embrace their own Brehon law, which puniſhes no offence, but with a fine or ericke? If the Iriſh be not permitted to purchaſe eſtates of freeholds or inheritance, which might deſcend to their children, according to the courſe of our common law, muſt they not continue their cuſtom of taniſtry, which makes all their poſſeſſions uncertain, and brings confuſion, barbariſm, and incivility? In a word, if the Engliſh would neither in peace govern them by the law, nor in war root them out by the ſword, muſt they not needs be pricks in their eyes and thorns in their ſides, till the world's end."

Sir John Wogan, appointed to the government in the year 1295, endeavoured to enforce the laws, and to keep in order the turbulent nobles of Engliſh extraction. For this purpoſe a parliament was ſummoned more regularly than ſuch aſſemblies had hitherto been convened in Ireland. The regulations made by it, however, though calculated to check the diſorders of the time, were either of little avail, or their effect of ſhort duration; and the country ſtill continued in a diſtracted ſtate. The weak government of the ſecond Edward left the great lords at full liberty to purſue their reſpective ſchemes of private intereſt, when an invaſion by Edward, the brother of Robert Bruce, now eſtabliſhed king of Scotland, ſupported by the chieftains of Ulſter, reduced them to the greateſt diſtreſs. Bruce was even crowned king of Ireland at Dundalk, and proceeded into Munſter, carrying devaſtation wherever he went. His troops, however, waſted away by peſtilence and famine, were reduced to a ſmall number, and in a battle, which he too eagerly fought, he was ſlain the third year after his landing in Ireland. On his defeat, matters reverted to the old channel, and ſo continued through the ſucceeding reign, until the appointment of Lionel, the king's ſecond ſon, to be chief governor in 1361. Before notice is taken of his proceedings, it will be neceſſary to obſerve, that in the reign of Edward II., Maurice Fitz-Thomas of Deſmond, being chief commander againſt the Scots, began that extortion of coin and livery, which is called, in the old ſtatutes, *a damnable cuſtom*, and the impoſing and taking of them declared high treaſon. Theſe words imply that he and his army exacted food for themſelves and their horſes, and money at pleaſure, without any ticket, or other ſatisfaction. And this was, after that time, the general fault of all the governors and commanders of the army in Ireland, though ſome were more cruel in the exaction than others. "Beſides," ſays Davies, "the Engliſh colonies, being diſperſed in every province of this kingdom, were enforced to keep continual guards upon the borders and marſhes round about them; which guards, conſiſting of idle ſoldiers, were likewiſe impoſed as a continual burden upon the poor Engliſh freeholders, whom they oppreſſed and impoveriſhed in the ſame manner. And becauſe the great Engliſh lords and captains had power to impoſe this charge, when and where they pleaſed, many of the poor freeholders were glad to give unto theſe lords a great part of their lands, to hold the reſt free from that extortion; and many others, not being able to endure that intolerable oppreſſion, did utterly quit their freeholds, and returned into England. By theſe means the Engliſh colonies grew poor and weak, though the Engliſh lords grew rich and mighty; for they placed Iriſh tenants upon the lands relinquiſhed by the Engliſh; upon them they levied all Iriſh exactions; with them they married, and foſtered, and made goſſips; ſo as within one age the Engliſh, both lords and freeholders, became degenerate and mere Iriſh in their language, in their apparel, in their arms and manner of fight, and all other cuſtoms of life whatſoever."

Lionel, ſoon after created duke of Clarence, was, in right of his wife, poſſeſſed of a conſiderable territory in Ireland, and his firſt object ſeems to have been to recover parts of it from thoſe who were now called *rebels*. His military proceedings were of no great moment, but he applied himſelf with zeal and diligence to the reformation of the Engliſh ſettlers. A parliament was ſummoned at Kilkenny, which was more reſpectable and numerous than any preceding one, and the reſult of the deliberation of which was that ordinance, known by the name of the Statute of Kilkenny: this was in 1367. The great object of this ſtatute was to reduce the Engliſh colonies to obedience of the Engliſh law and magiſtrates. "The preamble of it recites," (to uſe the abſtract given of it by Dr. Leland,) "with a deciſion not without colour, but yet too general and indiſcriminate, that the Engliſh of the realm of Ireland, before the arrival of the duke of Clarence, were become mere Iriſh in their language, names, apparel, and manner of living; had rejected the Engliſh laws, and ſubmitted to thoſe of the Iriſh, with whom they had united by marriage alliance to the ruin of the general weal. It was, therefore, enacted, that marriage, nurture of infants, and goſſipzed with the Iriſh, ſhould be conſidered and puniſhed as high treaſon. Again, if any man of Engliſh race ſhall uſe an Iriſh name, the Iriſh language, or the Iriſh apparel, or any mode or cuſtom of the Iriſh, the act provides that he ſhall forfeit lands and tenements, until he hath given ſecurity in the court of chancery to conform in every particular to the Engliſh manners. The Brehon law was pronounced to be a pernicious cuſtom and innovation lately introduced among the Engliſh ſubjects. It was, therefore, ordained, that in all their controverſies they ſhould be governed by the common law of England: and that whoever ſhould ſubmit to the Iriſh juriſdiction, was to be adjudged guilty of high treaſon. As the Engliſh had been accuſtomed to make war and peace with the bordering enemy at their pleaſure, they were now expreſsly prohibited from levying war upon the Iriſh without ſpecial warrant from the ſtate. It was alſo made highly penal to the Engliſh, to permit their Iriſh neighbours to graze their lands, to preſent them to eccleſiaſtical benefices, or to receive them into monaſteries or religious houſes; to entertain their bards, who perverted their imaginations by romantic tales; or their news-tellers, who ſeduced them by falſe reports. It was made felony to impoſe or ceſs any forces upon the Engliſh ſubject againſt his will. And as the royal liberties and franchiſes were become ſanctuaries for malefactors, expreſs power was given to the king's ſheriffs to enter into all franchiſes, and there to apprehend felons and traitors. Laſtly, becauſe the great lords, when they levied forces for the public ſervice, acted with partiality, and laid unequal burdens upon the ſubjects, it was ordained that four wardens of the peace in every county ſhould adjudge what men and armour every lord and tenant ſhould provide. The ſtatute was promulged with particular ſolemnity; and the ſpiritual lords, the better to enforce obedience, denounced an excommunication on thoſe who ſhould preſume to violate it in any inſtance." After obſerving that theſe inſtitutions did not apply to any except the Engliſh ſettlers, Dr. Leland goes on to remark upon the want of equity and good policy towards the Iriſh. "Extenſive views, liberal ſentiments, and a generous zeal for public happineſs would have prompted them to ſome meaſures for conciliating the affections as well as for ſubduing the perſons and poſſeſſions of the Iriſh; would have led them to demonſtrate that they were the protectors and benefactors, not the arbitrary maſters of thoſe Iriſh natives whom they held in ſubjection; and to convince the moſt obſtinate inſurgents, that an honourable ſubmiſſion to the king of England was the only means of reſcuing them from the miſeries of their own petty factions and tyrannies; a glorious exchange of the rudeneſs, the diſorders, and diſtreſſes of anarchy for the peace, the dignity, and the valuable advantages of ſocial and civil life."

The next attempt that was made to reduce Ireland was by Richard II., who, in 1394, went there with an army of 4000 men at arms, and 30,000 archers, attended by a number of diſtinguiſhed noblemen. The preſence of ſuch an army induced all the chieftains to make ſubmiſſion in a formal manner, with which Richard was contented. By this expedition he did not extend the Engliſh juriſdiction, nor add to his revenue; and he had no ſooner departed than the Iriſh lords laid aſide their maſks of humility, and ſcorning the weak forces which the king had left behind him, began to infeſt the borders, and in defence of theſe, Mortimer, the king's lieutenant, and heir apparent of the crown, was ſlain. To revenge his death, Richard went to Ireland a ſecond time with a great force; but during his abſence, an inſurrection took place in England, which terminated in his depoſition. During the reigns of Henry IV. and V. nothing was attempted beyond the defence of the Engliſh pale, including four counties, *viz.* Dublin, Kildare, Meath, and Louth; and during the early part of the reign of Henry VI., ſo much had the Iriſh, and thoſe Engliſh who had adopted their cuſtoms, increaſed in ſtrength, that even the defence of thoſe countries was become a matter of great difficulty. Towards the latter end of the reign of Henry VI., Richard, duke of York, was appointed chief governor, who, though he gained little advantage over the Iriſh, ſucceeded in attaching to himſelf not only the lords of the pale, but others of Engliſh race, numbers of whom engaged warmly in the ſupport of his claim to the crown. An attachment to his deſcendants long continued to influence the Anglo-Iriſh, as was conſpicuous in the reign of Henry VII. During the period of the civil wars, the ſtate of Ireland was very bad, in conſequence of the neglect of the Engliſh government; and the exaction of coin and livery, which grew exceſſive and intolerable. Such was the violence of faction, that the earl of Deſmond, the moſt powerful nobleman in Ireland, was ſeized and beheaded under the pretext of offences which were generally committed with impunity. In 1474, the earl of Kildare, being lord deputy, formed an aſſociation of the principal noblemen and gentlemen within the pale for its defence againſt ſudden invaſion, called the "Brotherhood of St. George," and this continued till the tenth year of Henry VII. This prince, as ſoon as he found leiſure to attend to the affairs of Ireland, was determined to break the power of thoſe lords who, by their influence in the country, had hitherto managed every thing as ſuited their own private views. For this purpoſe he ſent ſir Edward Poynings as lord deputy, accompanied by an Engliſh chancellor and treaſurer, and Engliſh judges. In a parliament held at Drogheda, by this deputy in 1495, moſt of the ſtatutes of Kilkenny were revived and confirmed, with many others tending to leſſen the influence of the great lords, and to reform the manners of the pale. Amongſt others was a ſtatute, which has ſince been the ſubject of much diſcuſſion, under the name of Poynings' law. This enacted, that no parliament ſhould be held without the king's previous permiſſion, and that no acts ſhould be paſſed until they had been previouſly ſubmitted to the king and his council in England, approved by them, and returned under the great ſeal of that realm. Some alteration was afterwards made in the mode of preparing and tranſmitting the bills, but the effect of this law, which was to render the Iriſh government more dependent on England, continued until the reign of his preſent majeſty, king George III. At the time, and long after, this law was conſidered by the Engliſh ſettled in Ireland as a deſirable check on the chief governors, who had frequently ſummoned parliaments, and given aſſent to various acts, not only without communication with the ſovereign or his Engliſh council, but even contrary to his intereſt, and to ſerve their own private purpoſes. The vigorous adminiſtration of the earl of Kildare effectually preſerved the pale, and though an ignominious tribute, which had been long paid to many Iriſh chieftains, was not yet withdrawn, the hoſtilities of ſuch chieftains were oppoſed and chaſtiſed. The ſuperiority of the Engliſh government over the *whole* of Ireland was once more aſſerted, and even ſome of the moſt ferocious chieftains became the avowed friends of the Engliſh power. On the other hand, the old Engliſh ſettlers had become ſo connected with the Iriſh as to be ſcarcely diſtinguiſhable from them; they adopted their language and cuſtoms, and were even more adverſe to the government than the native Iriſh. During the early part of the reign of Henry VIII. no material change took place in the ſtate of Ireland, which Kildare, with ſome little interruption, continued to govern. The great poſſeſſions of this nobleman, and his connections in Ireland, eſpecially with the houſe of Deſmond, another branch of the Geraldine family, and with the great Iriſh ſept of O'Nial, gave weight to his government, whilſt his alliance to ſome powerful Engliſh families ſtrengthened his intereſt at court. Francis I. of France, having, however, ſent an agent to tamper with Deſmond, with a view to diſtreſs Henry, and this having been diſcovered, Kildare was ordered to arreſt that nobleman, but was either unwilling or unable to effect it. This diſpleaſed the king and involved him in difficulties, and the raſhneſs of his ſon having involved him in open rebellion, all the members of his family were put to death, except a youth of twelve years old, who eſcaped to Italy, and was protected by cardinal Pole, notwithſtanding the king's efforts to deſtroy him.

Whilſt theſe diſturbances took place in Ireland, the king, influenced by very unworthy motives, though his conduct was attended with the moſt happy effects, had thrown off the yoke of the pope, and had been declared by parliament, and by a convocation of the clergy, "ſupreme head, on earth, of the church of England." His new queen was partial to the reformation, and Cromwell, his prime miniſter, was active in promoting it. Henry was reſolved to extend his new power to Ireland, and Browne, archbiſhop of Dublin, a creature of Cromwell's, was zealous in promoting his views. Ireland, however, was much leſs prepared for ſuch meaſures than England had been. The continual hoſtilities in which all parties were engaged, prevented the progreſs of knowledge and civilization, even within the Engliſh pale, and the clergy, eſpecially in remote parts, were amongſt the moſt ignorant, and conſequently the moſt bigotted, partiſans of Rome. A decided oppoſition was therefore given to the acknowledgment of the king's ſupremacy, headed by the primate, and encouraged by the emiſſaries of Rome. Fear indeed induced the parliament to paſs the propoſed act, Browne having pronounced thoſe, who made any difficulty of concurring with him, to have no right to be regarded or treated as loyal ſubjects; but great reſiſtance was made to the carrying of it into effect. Lord Leonard Grey, the deputy, who had reduced the power of the Geraldines, now ſhewed equal activity in ſuppreſſing the advocates of Rome, and by a great victory over O'Nial and his aſſociates at Bellahoe, put an end for a time to open reſiſtance. The ſuppreſſion of the monaſteries was carried into effect, and the moſt powerful and turbulent chieftains appeared earneſt to expreſs their attachment to the crown. Sir Anthony St. Leger aſſumed his charge as governor in 1541, with the faireſt preſages of tranquillity and public happineſs. A parliament ſummoned by him declared Henry king of Ireland; this title, now firſt aſſumed, was acknowledged by O'Nial, and the other chieftains by indenture, and they at the ſame time renounced the papal authority in the fulleſt manner. Various regulations were paſſed for the government of Munſter, where the laws of England, though formerly eſtabliſhed, had been diſuſed for 200 years. St. Leger alſo prevailed upon O'Nial, O'Brien, and the head of the Burkes called Mac William, to go into England, and preſent themſelves to the king, who conferred on them the dignity of earls, and granted unto them their ſeveral countries by letters patent. He alſo granted to each a houſe and lands near Dublin, that they might, by frequent reſidence there, learn obedience and civility of manners. The reign of Edward VI. was chiefly occupied in endeavours to introduce the reformed liturgy, which was effected in Dublin and ſome other places, but was very generally diſagreeable. On the acceſſion of Mary, popery was reſtored without any difficulty, except that occaſioned by the alienation of church property in the preceding reigns; but the regulations which the change required occupied much time and attention. The diſtricts of Leix and Ophaly, which had been before reduced, were now made ſhires under the names of the Queen's and King's counties, and the native Iriſh were, in general, not adverſe to a government which favoured their religion. The reign of Mary, however, was ſhort; and her ſucceſſor Elizabeth was friendly to the reformation. Before we proceed to notice the more intereſting tranſactions of this long reign, it will be uſeful briefly to conſider the ſtate of the country. The inhabitants have been claſſed in four diviſions: 1. The native, or, as they were contemptuouſly called, the *mere* Iriſh. 2. The degenerate Engliſh, or thoſe of Engliſh deſcent who had intermarried with the Iriſh, and adopted their cuſtoms and language, ſo as to be ſcarcely diſtinguiſhable from them. They were alike governed by the Brehon law, for an account of which ſee the article BREHON; and alike uſed the mode of ſucceſſion called Taniſtry, for which ſee TANISTRY. 3. The Engliſh of blood, ſome of whom were poſſeſſed of large eſtates, and though the ſituation of the country did not allow of much refinement, yet their occaſional intercourſe with England, or with the Engliſh conſtantly coming over, enabled them to keep up an exterior appearance of Engliſh manners. Theſe chiefly reſided within the pale. 4. The Engliſh of birth, ſent over to fill the principal offices of ſtate, and who generally acquiring property in the country, their deſcendants were continually forming an addition to the 3d claſs. Theſe, who might have been called *mere* Engliſh, as they were ever diſpoſed to ſacrifice the intereſt of Ireland to that of England, were the perſons countenanced and aſſiſted by the Engliſh government. Spenſer the poet, who reſided in Ireland for ſome years in this reign, has deſcribed ſeveral of the Iriſh cuſtoms in his dialogue on the ſtate of Ireland; and, though it muſt be remembered that he ſaw every thing through the eye of prejudice, yet a quotation or two may enable us to form a more correct idea of the licentiouſneſs of manners of the Iriſh chieftains. Whatever opinion we may form of the impolicy and injuſtice of the Engliſh ſettlers and government on many occaſions, it muſt be acknowledged that the Iriſh laws and cuſtoms were favourable to a ſavage wildneſs of manners inconſiſtent with the happineſs of ſocial and civil life. After noticing the barbarous manners of the Gallowglaſſes or infantry, of the Kernes or predatory cavalry, and of the horſe boys, Spenſer alſo deſcribes two claſſes of men who contributed very much to the diſſoluteneſs of the chieftains, *viz.* the Bards and the Carrows. "Theſe Iriſh bards," ſays he, "are ſo far from inſtructing young men in moral diſcipline, that they themſelves do more deſerve to be ſharply diſciplined; for they ſeldom uſe to chooſe unto themſelves the doings of good men for the arguments of their poems, but whomſoever they find to be moſt licentious of life, moſt bold and lawleſs in his doings, moſt dangerous and deſperate in all parts of diſobedience and rebellious diſpoſition, him they ſet up and glorify in their rhymes, him they praiſe to the people, and to young men make an example to follow." Then, having deſcribed the youth of one of theſe chieftains, he adds "in which, if he ſhall find any to praiſe him, and to give him encouragement, as thoſe bards and rythmen do for little reward, or a ſhare of a ſtolen cow; then waxeth he moſt inſolent, and half mad with the love of himſelf and his own lewd deeds. And as for words to ſet forth ſuch lewdneſs, it is not hard for them to give a goodly and painted ſhow thereunto, borrowed even from the praiſes which are proper to virtue itſelf. As of a moſt notorious thief and wicked outlaw, who had lived all his lifetime of ſpoils and robberies, one of their bards in his praiſe will ſay, That he was none of the idle milkſops that was brought up by the fire-ſide, but that moſt of his days he ſpent in arms and valiant enterprizes, that he did never eat his meat before he had won it with his ſword; that he lay not all night ſlugging in a cabin under his mantle, but uſed commonly to keep others waking to defend their lives, and did light his candle at the flames of their houſes, to lead him in the darkneſs; that the day was his night, and the night his day; that he loved not to be long wooing of wenches to yield to him, but where he came, he took by force the ſpoil of other men's love, and left but lamentation to their lovers; that his muſic was not the harp, nor lays of love, but the cries of people, and the claſhing of armour; and finally, that he died not bewailed of many, but made many wail when he died that dearly bought his death." At the ſame time, in anſwer to a queſtion reſpecting theſe poems, "Whether they be any thing witty or well favoured as poems ſhould be," this excellent judge replies, "Yea truly, I have cauſed divers of them to be tranſlated unto me, that I might underſtand them, and ſurely they ſavoured of ſweet wit and good invention, but ſkilled not of the goodly ornaments of poetry; yet were they ſprinkled with ſome pretty flowers of their natural device, which gave good grace and comelineſs unto them, the which it is great pity to ſee abuſed, to the gracing of wickedneſs and vice, which, with good uſage, would ſerve to adorn and beautify virtue." Theſe bards probably had as great effect in rouſing a ſpirited oppoſition to the Engliſh as the Welſh bards, whom the policy of the firſt Edward led him moſt iniquitouſly to deſtroy. As to the Carrows, they are "a kind of people that wander up and down to gentlemen's houſes, living only upon cards and dice, the which, though they have little or nothing of their own, yet will they play for much money, which, if they win, they waſte moſt lightly, and if they loſe, they pay as ſlenderly, but make recompence with one ſtealth or another, whoſe only hurt is not, that they themſelves are idle loſſels, but that, through gaming, they draw others to like lewdneſs and idleneſs. And to theſe may be added another ſort of like looſe fellows, which do paſs up and down amongſt gentlemen by the name of jeſters, but are indeed notable rogues, and partakers not only of many ſtealths, by ſetting forth other men's goods to be ſtolen, but alſo privy to many traiterous practices, and common carriers of news, with deſire whereof you would wonder how much the Iriſh are fed."

Almoſt the whole of the two firſt claſſes, and the greater part of the Engliſh of blood, were zealouſly and blindly attached to the doctrines and diſcipline of the church of Rome, in which they had been educated, and were therefore eaſily inſtigated to ſupport Philip of Spain, a Catholic prince, to whom they had once been ſubject againſt their Proteſtant miſtreſs. In 1560, the firſt parliament in this reign was aſſembled for the purpoſe of re-eſtabliſhing the queen's ſupremacy and the reformed worſhip. The houſe of commons conſiſted of only 76 members, from thoſe parts where the Engliſh intereſt was ſtrongeſt, yet the change was not effected without much clamour and oppoſition. Laws, however, were paſſed, reſtoring eccleſiaſtical juriſdiction to the crown, enforcing the uſe of the common prayer, and obliging all ſubjects to attend the public ſervice of the church. But though the deputy ſucceeded with parliament, the meaſures were very unpalatable. "The numerous partizans of Rome inveighed againſt the heretical queen, and her impious miniſters. The clergy who refuſed to conform abandoned their cures; no reformed miniſters could be found to ſupply their places; the churches fell to ruin; the people were left without any religious worſhip or inſtruction. Even in places of moſt civility, the ſtatutes lately made were evaded or neglected with impunity. The ignorant were taught to abominate a government, which they heard conſigned to all the terrors of the divine vengeance; were exhorted to ſtand prepared for a glorious opportunity of aſſerting the cauſe of religion; and aſſured of effectual ſupport, both from the pope, whoſe authority had been profaned, and from the king of Spain, now particularly offended at Elizabeth."

Beſides the diſorder occaſioned by theſe efforts to force upon the people a religion they deteſted, much uneaſineſs was occaſioned to the government by the reſtleſs turbulence of Shane or John O'Nial, the moſt powerful chieftain in Ireland. Sir Henry Sidney, to whom Elizabeth entruſted the government for many years, and who deſerved her confidence, ſucceeded in attaching to him ſeveral inferior chieftains whom O'Nial had injured, and with their aid completely ſubdued him. But ſcarcely was the northern diſturbance allayed, than another broke out in the ſouth, headed by the earl of Deſmond, which was of longer continuance. Sir John Perrott, preſident of Munſter, an office lately inſtituted, not only ſuppreſſed the rebellion, but enforced ſuch a ſtrict execution of Engliſh law, as to give an unuſual appearance of peace, induſtry, and civility, to the whole province. Peace, however, was of ſhort continuance, and an attempt of Sidney to raiſe a tax by order of council, without authority of parliament, excited a moſt determined oppoſition on the part of the nobility and gentry of the pale. Theſe diſcontents were encouraged by the emiſſaries of Philip II.; a body of Spaniards landed in Kerry, who acted in concert with Deſmond; and a protracted warfare was maintained, which, as uſual, terminated in favour of the Engliſh. The enormous demeſnes of Deſmond were forfeited, and divided amongſt a number of Engliſh *Undertakers*, as they were called, who entered into a ſtipulation to plant a certain number of Engliſh families on their eſtates, in proportion to the number of acres, a ſtipulation frequently neglected to the great injury of the ſettlement. Amongſt others who received portions, were ſir Walter Raleigh, who had ſerved with reputation for bravery, though not without the ſtain of cruelty, and Edmund Spenſer, the poet, who has introduced ſeveral alluſions to Ireland into his Fairy Queen. In 1584, ſir John Perrott was ſent over as chief governor, and as war and inſurrection ſeemed to be then extinguiſhed, he applied himſelf to the general extenſion of Engliſh law with conſiderable ſucceſs. He nominated ſheriffs for the counties of Connaught, and alſo for ſeven new counties inſtituted in Ulſter, with other neceſſary officers; but his plans for more extenſive improvement were thwarted in England from ill-timed economy, and notwithſtanding all his exertions, a parliament, ſummoned by him in the following year, rejected almoſt every meaſure propoſed to them. The oppreſſion of the natives by the Engliſh ſettlers, which Perrot in vain endeavoured to repreſs, ſupplied new cauſes of diſcontent; and this active governor was at length obliged to leave Ireland. A more general ſpirit of inſurrection than at any former period was now excited, and Elizabeth found it neceſſary to make uncommon efforts, leſt England ſhould be placed between the forces of Spain collected in the Netherlands, and their naval ſtrength and armaments ſtationed in the harbours of Ireland. The miſconduct of ſucceſſive governors, eſpecially of Elizabeth's favourite, the earl of Eſſex, who had an army of 20,000 men, increaſed the danger, and before the rebels were ſubdued, a Spaniſh army took poſſeſſion of Kinſale, and a nuncio arrived from the pope to inſtigate the friends of Rome to make every exertion. The abilities and exertions of Blount, lord Mountjoy, lord deputy, and of ſir George Carew, preſident of Munſter, aſſiſted by conſiderable reinforcements from England, at length effected the ſurrender of the Spaniards, and the complete reduction of all the lords and chiefs, who, until then, had ruled in the iſland, after a war which laſted about ſeven years. Elizabeth did not live to ſee this event, the final capitulation not having been ſigned until a few days after her death, though before the news of it had reached Ireland.

The reign of James I. was one of at leaſt comparative tranquillity. All violent oppoſition to the authority of the Engliſh government and crown was put an end to. "The ſpirit of Iriſh reſiſtance," to uſe the expreſſions of ſir John Davies, "was brayed, as it were, in a mortar, with the ſword, famine, and peſtilence altogether." Both the degenerated Engliſh and the native Iriſh were alike overcome. At the ſame time the power of the judges and of the Engliſh government was extenſively fixed, the Iriſh laws and cuſtoms were aboliſhed, and the Engliſh laws eſtabliſhed in all caſes, without exception, through the whole iſland. Numerous colonies were alſo ſent from England and Scotland, eſpecially from the latter, to occupy the forfeited eſtates, and ſeven entire northern counties were allotted to undertakers, which was called the "Plantation of Ulſter," a meaſure which was certainly attended by the introduction of induſtry and order into that province. With a view to ſtrengthen the Proteſtant party, great care was taken that theſe ſettlers ſhould be Proteſtants, and they were chiefly Scotch Preſbyterians, or Engliſh Puritans, the latter of whom found their ſituation at home uneaſy, from James's zealous attachment to their adverſaries. For the ſame purpoſe, many new boroughs were erected, ſo as to give a majority in parliament to the ſame party, which they could not otherwiſe have accompliſhed, as the county members were likely to be almoſt all Papiſts. It would have been at this time a wiſe and liberal policy to have completely united the two countries, ſo as to have but one parliament, which might have been eaſily effected at that time. This would have rendered ſuch extraordinary proceedings entirely unneceſſary, and would in all probability have prevented much of the miſchief which afterwards occurred; but the ſettlers were conſidered as a colony, dependent on the mother country, to whoſe intereſt they were to be ſubſervient, without preſuming to interfere in any but the petty regulations of their own iſland, and all but the colony were regarded as ſecret enemies, who could not be too carefully watched, or too ſtrictly kept in ſubjection. In conſequence, the diſtinctions which had ſubſiſted amongſt them were in a great meaſure done away, and they united in defence of a religion to which they were equally attached, and of rights which they conceived to be equally invaded. Such was the prevailing ſentiment, when, after an interval of *twenty-ſeven* years, a parliament, ſummoned by Chicheſter, the deputy, met in 1613. The recuſants, (as they were called, from their refuſal to acknowledge the king's ſupremacy, and to attend the eſtabliſhed worſhip,) were prepared to diſpute every ſtep, and were numerous in both houſes. Such indeed was their reſiſtance, that, although the biſhops in the upper, and the new borough members in the lower houſe, gave government a majority, it was found neceſſary to prorogue them until the following year, when acts for acknowledging the king's title, for ſettling upon him a revenue, and for confirming the northern attainders, were paſſed. During the remainder of this reign, and for the early part of the ſucceeding one, the two contending parties often ſhewed their rancour without proceeding to extremities, whilſt the period of peace was employed by ſome in active exertions for the eſtabliſhment of manufactures, and the extenſion of cultivation. In 1633, lord Wentworth, better known by his later title of earl of Strafford, commenced his adminiſtration. He treated Ireland with ſeverity, as a conquered country, the ſubjects of which had forfeited the rights of men and citizens, and depended ſolely on the royal grace. The recuſants and the Puritans were equally offended by his meaſures; yet, by artfully plying one party againſt the other, he contrived to manage a parliament which he ſummoned, and to perform many acts of ſeverity with a vigour beyond the law.

At length the time arrived when Ireland was to be once more involved in war and bloodſhed. The impeachment of lord Strafford before the Engliſh parliament was one of the firſt ſteps to the overthrow of the royal authority. The ſevere reſtrictions impoſed on the Catholic party, which, as before obſerved, included almoſt all the inhabitants, except the new ſettlers, led them to watch for an opportunity of revenge; and the diſtracted ſtate of affairs in England affording a favourable opportunity, a general inſurrection was planned, and carried into execution on the 23d of October 1641, an event productive of the moſt baneful conſequences to the peace, union, and proſperity of Ireland. This civil war, or rebellion, as it is juſtly called, even admitting the palliations that have been urged, was begun by the native Iriſh, and they were afterwards joined by moſt of the Catholics. Happy would it be for the country if the acts of violence then committed could be for ever buried in oblivion. The writers on both ſides are charged with partiality by their opponents; yet what they admit reſpecting their own parties is enough to ſhew that there was on both ſides much to blame, and much to lament. For eleven years Ireland was a ſcene of confuſion, there being no leſs than five different parties, of whom it has been ſaid, that each, in the courſe of the war, at one time or other, fought againſt the faction with which it had formerly ſided. At length, in 1652, Cromwell aſſumed the command of the parliamentary army, to which he brought a conſiderable reinforcement, and ſoon completely reduced the whole iſland. The lands which had belonged to thoſe who had been killed, or who were deprived of their poſſeſſions by force of arms, were now given to new coloniſts, many of whom had been officers in the victorious army. Limits were aſſigned to the Iriſh, beyond which they were not to come, and theſe continued to be ſtrictly enforced till the reſtoration. The Proteſtant and Engliſh intereſt was now more completely eſtabliſhed than at any former time; but though the Catholics had loſt the power to injure, they retained their animoſity. At this period, indeed, the intereſt and power of the old native Iriſh, as a diſtinct claſs of inhabitants, was entirely broken, their numbers being from that time much exceeded by thoſe of the old and new inhabitants of the Britiſh race.

On the reſtoration it was hoped that the king would have overturned all the meaſures of Cromwell; but he confirmed all the grants, and the ſituation of the Catholics was little, if at all, amended. The duke of Ormond, who had great influence in Iriſh affairs, was a ſteady Proteſtant; and whatever might be the king's private wiſhes, no ſteps were taken in favour of the oppoſite party till near the concluſion of his reign, when his brother the duke of York appears to have had great influence over him. On the acceſſion of James II. the Romiſh party in Ireland were inſpired with the moſt extravagant expectations; they fancied themſelves already reſtored to the eſtates of their anceſtors, and poſſeſſed of every advantage to be derived from a king of their own religion. "At length," ſays Mr. Newenham, "the infatuated James, yielding to the impolitic counſels of men who, perhaps, might have governed a religious fraternity well, but who were utterly ignorant of the government of an empire; and taught to regard the Iriſh Roman Catholics as fit inſtruments for the accompliſhment of his viſionary and deſpotic projects, gradually raiſed, invigorated, and encouraged them. By the obſequious forbearance, or conſtrained acquieſcence of Clarendon, and the indefatigable exertions of the zealous and plenipotent Tyrconnel, they were once more prepared to renew the terrible conflict; and animated by no ordinary combination of forcible motives, recurred to arms; after incautiouſly co-operating with their bigoted ſovereign, in perſecuting their Proteſtant countrymen without meaſure and without remorſe; and thus, in ſome degree, juſtifying that ſevere retaliation which they themſelves were ſoon after to experience.

——— Eheu,
Quam temere in noſmet legem ſancimus iniquam.

But England was not then, as on the preceding occaſion, paralyzed by internal commotions. The prince who had aſcended the abdicated throne was an experienced general, and a ſound politician. The viſionary James was greatly overmatched. The Iriſh Roman Catholics were, in conſequence, completely vanquiſhed; ſtripped of political power; hurled from every poſt of truſt and emolument, and almoſt entirely diſpoſſeſſed of their remaining lands. The work of vengeance, however, was not yet finiſhed, nor could it perhaps have terminated thus, conſiſtently with the weakneſs and wickedneſs inſeparable from human nature. The Iriſh Proteſtants, ſtill horrified by the remembrance of the ferocious maſſacre of 1641; recollecting the havoc and miſery of the long war which ſucceeded that event; dreading a repetition of the tyrannical meaſures, the relentleſs, and, for the moſt part, unprovoked perſecution from which they had been recently reſcued; and a renewal of thoſe bloody ſcenes which they had juſt ſurvived; yielding, in ſhort, to the united impulſe of revenge and fear, and thereby hurried beyond the bounds of political honour and prudence, reſorted in the following reign, when they were rather encouraged to do ſo, to every expedient which legiſlative ingenuity could ſupply, however likely to prove ultimately detrimental to themſelves, with a view of reducing their inveterate enemies, the Roman Catholics, to abſolute and irremediable political impotence. A code of defenſive and preventive ſtatutes, being the ſtamp of the paſſions by which it was originated, was in the end compiled: a code which was not merely limited to the precluſion of hoſtilities on the part of the Roman Catholics, but extended to the abolition of their venerated religion, which, in Ireland, had ſcarcely ever been fairly combated by the only weapons that ever ſhould have been employed againſt it, the pens or tongues, and attractive examples of Proteſtants: a code which impeded the progreſs of the former in the paths of induſtry; thwarted every ſpecies of laudable ambition by which they might have been actuated; placed them on the footing of aliens in their native land; expoſed them to vexatious outrages and ſpoliation; reduced them almoſt to the condition of ſlaves; obſtructed matrimonial alliances between them and the Proteſtants, from whence, it is probable, the happieſt effects might have flowed; and, worſe than all, held forth incitements to filial contumacy, to a violation of one of the commandments of God; and introduced amongſt them principles of duplicity and treachery. A code, which, while it oppreſſed, and ſeemed to overwhelm the Roman Catholics, facilitated the obtruſion of thoſe jealous meaſures, thoſe commercial reſtraints which had long been the effect of retaining one of the faireſt portions of the globe in a ſtate of poverty and political inſignificance. The maſſacre of 1641, which had been induſtriouſly exhibited in the moſt horrifying colours, together with the cruel perſecution experienced during the ſhort reign of king James in Ireland, both ſtill freſh in the recollection of the Proteſtants, neceſſarily heightened their animoſity to the utmoſt; while repeated diſcomfitures and diſaſters, and aggravated oppreſſion, together with the accumulated miſery produced by this revengeful code, certainly inconſiſtent with the principles of ſound policy and true religion, naturally rendered the hatred of the Roman Catholics virulent beyond example. An unparalleled combination of irritating, maddening circumſtances fomented, on both ſides, the moſt rancorous malignity. The idea of a Proteſtant in the mind of a Roman Catholic, and that of the latter in the mind of the former, now became cloſely aſſociated with every idea that could engender wrath, malice, and vengeance in the heart of man. Each abhorred the other; each longed for the extirpation of the other."—"This among countrymen, among the friendly, cheerful, and hoſpitable people of Ireland, among Chriſtians, among thoſe who looked forward to eternal happineſs through the mediation of the ſame Saviour, among thoſe who adored the ſame Trinity, among thoſe who agreed in all the eſſential points of religion, the maintenance of a few different ſpeculative articles, and the obſervance of a few different rites, confeſſedly inoperative in ſocial life, and conſequently unworthy of ſerious notice, being unhappily combined with oppoſite intereſts, being coeval and concurrent with the moſt energetic principles of diſcord, ſerving as the teſts, ſymbols, or diſtinctive characters of two parties inveterately and unappeaſably hoſtile to each other, became at length, what in their natural unconnected ſtate they could never poſſibly have become, alimentary to the moſt vehement deteſtation."

Though we cannot agree with the reſpectable writer of the preceding paſſage in all his remarks, eſpecially in thoſe which ſeem to think lightly of the difference between the Proteſtant and Catholic faith; yet it, on the whole, contains ſo juſt and candid a repreſentation of the unhappy differences between the parties, and is evidently written with ſuch a deſire of conciliation, that we have copied it without change, anxiouſly wiſhing that all the gentlemen of Ireland, of every ſect, ſaw the matter in the ſame light, and were equally deſirous of improving paſt evils to preſent harmony.

The events peculiar to Ireland, excepting the penal code, juſt remarked on, will not require much notice during the four reigns ſucceeding the revolution. The uniform policy was to keep Ireland in a ſtate of dependency, and to prevent her manufactures or commerce interfering with thoſe of England.

Encouragement was indeed given to the linen manufacture, and it proved a ſource of great benefit to the country, but the woollen manufacture was kept down, and the reſtrictions on commerce ſhewed a moſt unwarrantable jealouſy. As the dependence of Ireland on England was never loſt ſight of, ſo ſome occaſions occurred in which the parliament of the latter directly exerted its authority. In the reign of William acts were paſſed, by which Ireland was bound. In the year 1698, Mr. Molyneux publiſhed a pamphlet, entitled "The Caſe of Ireland being bound by Acts of Parliament in England, ſtated," in which he called in queſtion their right to do ſo, and his ſentiments were known to be thoſe of the Iriſh parliament and people. This book was condemned by the Engliſh parliament, which addreſſed the king on the pernicious aſſertions it contained, and on the dangerous tendency of the proceedings of the Iriſh parliament, and promiſed to give his majeſty their ready concurrence and aſſiſtance to preſerve and maintain the dependence and ſubordination of Ireland to the imperial crown of this realm. William promiſed on his part to fulfil their wiſhes, and notwithſtanding the diſcontent of the Iriſh people, ſuch was their divided ſtate, and ſuch the apprehenſion each party entertained of the other, that they were obliged to ſubmit. Another cauſe of controverſy occurred in 1719, in conſequence of an appeal being carried from the Iriſh to the Engliſh houſe of lords. The barons of the exchequer, who had carried into effect the decree of the Engliſh houſe, were impriſoned by the Iriſh one, but the diſpute terminated in a new act, by which it was enacted, "that the kingdom of Ireland is ſubordinate unto, and dependent upon, the imperial crown of Great Britain; and that the king's majeſty, by and with the conſent of the lords and commons of Great Britain, has full power and authority to make laws and ſtatutes to bind the people and the kingdom of Ireland." Soon after this, in 1723, a circumſtance occurred, which deſerves notice, both on account of the example it ſet, that the united, determined, and perſevering voice of a people muſt be ultimately ſucceſsful, and on account of the active part taken by the celebrated dean Swift, then reſident in Dublin. This was the well known affair of *Wood's halfpence*. A patent had been granted to a Mr. Wood, to ſupply Ireland with a certain quantity of copper halfpence and farthings for 14 years. It was alleged in Ireland, that this coin was greatly inferior in value to what it was made to paſs for. The parliament of Ireland addreſſed the crown againſt the meaſure of ſending the coin; and during their following biennial receſs, great complaints continued to be made both by individuals and by public corporations. It would appear that though the badneſs of Wood's halfpence was the pretext, the diſpute was, in reality, a queſtion of rights and independence. Dean Swift contributed much to the public diſcontent, by a ſeries of letters ſigned *A Drapier*, for diſcovering the author of the fourth of which, a reward of 300 pounds was offered. As ſuch precautions had been taken, that no evidence could be procured againſt the author, the printer was indicted, but the grand jury, inſtead of finding the bill, approved the publication. The ferment was ſo great, that if miniſters had perſevered, a new civil war would probably have ariſen, though it, like all preceding ones, would have only contributed, in all probability, to rivet the chains of Ireland more firmly. As it was, the patent was cancelled; and the ferment allayed. At this time the complaints of the people, on other accounts, were loud, of which dean Swift takes particular notice in his "Short View of the State of Ireland;" he compares this kingdom, in which a few placemen from England enjoyed plentiful ſalaries, to an hoſpital, in which all the houſhold officers grow rich, while the poor, for whoſe ſake it was built, are almoſt ſtarving for want of food and raiment. Such are the principal events in Ireland, in the interval between the revolution and the acceſſion of his preſent majeſty to the throne in 1760. The Catholics were under the diſabilities already ſtated, but the penal laws againſt them were ſeldom, if ever, enforced; and as the diſtance of time increaſed, the irritation occaſioned by former events was conſiderably abated. Many of that body acquired wealth in the way of trade, and the nobility and gentry enjoyed their eſtates in quiet. The Proteſtants alſo gradually loſt their apprehenſions, and were taken up with the conteſts againſt Britiſh ſovereignty, which about this time gave a continual intereſt to the proceedings of parliament, where ſome able men diſtinguiſhed themſelves by their oppoſition to government. This parliament was unchanged during the life of the ſovereign, and met every ſecond year; and as the preſent mode of vacating ſeats was unknown, when a vacancy happened by death, the greateſt exertions were uſed by the contending parties, and the election was uſually decided by the majority of the houſe. The Iriſh government was peculiarly circumſtanced. It was neceſſary that every act of parliament ſhould have the ſanction both of the Britiſh privy council, *i. e.* of the Britiſh miniſtry, and of the Iriſh parliament. It was therefore neceſſary for the former to be able to influence a majority of the latter. To do this, places and penſions were beſtowed on thoſe, whoſe powers of eloquence, or whoſe parliamentary intereſt made them ſerviceable; and beſides this, the miniſtry were obliged to gratify the leading faction, by complying with ſuch meaſures as were for their private advantage, although inconſiſtent with ſound policy, and the true intereſt of Ireland. Hence a number of parliamentary grants, which have been juſtly ſtigmatized as jobs, and hence the undetermined conduct of the Britiſh miniſtry reſpecting Iriſh meaſures, even on occaſions not long preceding the Union. The leading party in the Iriſh parliament muſt be gratified, becauſe otherwiſe the public buſineſs would be at a ſtand. The lord lieutenant was not reſident, except during the parliamentary ſeſſion; and the management of affairs was, at other times, entruſted to lords juſtices, generally the primate, the chancellor, and the ſpeaker of the houſe of commons; the two former invariably Engliſhmen, in whom confidence was chiefly placed, and the laſt, a man always poſſeſſed of great parliamentary influence from his talents and connections. The firſt ſtep to a change was the rendering parliaments octennial, which was moved by G. D. Lucas, and paſſed in 1768. The lord lieutenant now became conſtantly reſident, and the ſeſſions were held every year. The ſpirit of the Iriſh parliament increaſed; ſeveral men of great talents ſprung up, and whilſt the Britiſh miniſtry were engaged in their unhappy conteſt with America, they were obliged to yield to the people of Ireland firſt a free trade, and afterwards a repeal of the ſtatutes which rendered Ireland dependent. The volunteers, a body originally armed for the defence of the country againſt French invaſion, probably contributed to theſe meaſures by the terror they occaſioned to the miniſtry, whilſt the agitation in England towards the cloſe of the American war, and the unſettled ſtate of adminiſtration between the reſignation of lord North, and the appointment of Mr. Pitt, prevented that determined oppoſition which would have been made in a more ſettled ſtate of affairs. In 1778 the grievances of the Roman Catholics began to receive attention, and that body was reſtored to many privileges, of which they had been harſhly deprived. This was the commencement, and ſince that time all the moſt haraſſing diſabilities have been removed, though ſome ſtill remain, which are frequently the ſubject of parliamentary diſcuſſion. The events of the laſt 20 years are too recent to be enlarged on without that partiality from which human nature is ſcarcely ever exempt, and the detail would be perhaps unſuitable to a work of this general nature. Notwithſtanding the miſery occaſioned by the rebellion of 1798, and the low ſtate of many branches of trade and manufacture, Ireland has rapidly improved within that period, eſpecially in agriculture, and ſhould it be bleſſed with internal peace and union, it will ſoon, under the foſtering care of the legiſlature, riſe to a great degree of proſperity, and eſſentially contribute to the welfare and happineſs of the *United Kingdom.* See UNION. Beaufort's Memoir. Pinkerton's Geography. Spenſer. Cox. Davis. Hollingſhead. Leland. Curry. Newenham's State of Ireland, &c. &c.

IRELAND's *Eye*, a ſmall iſland in the Iriſh ſea, north of the hill of Howth, in the county of Dublin, Ireland, about a mile from the main land.

IRELAND, *New*, an iſland in the Pacific ocean, which is a long ſlip of land ſtretching from N.W. to S.E. about 270 miles, and ſeparated from *New Britain* (which ſee) by a channel through which Capt. Carteret paſſed in 1767, who gave its name to this iſland. This navigator found the nation very hoſtile, having lances headed with flint. Their faces were ſtreaked with white, and their hair beſprinkled with powder of the ſame colour. They are black, and ſaid to be woolly-headed, but without the thick lips or flat noſe of the negro. Some of the canoes of this iſland were 90 feet in length, formed out of a ſingle tree. Bougainville alſo viſited this country, and obſerved here the pepper-plant, and that ſingular inſect, the walking leaf; among its numerous birds was the great crowned pigeon. To the weſt of New Ireland, and approaching New Guinea, a ſucceſſion of little Archipelagos is found; in which are the Portland iſles, the Admiralty iſles, the Hermit and Exchequer iſles; all of which preſent one principal iſland, the centre of the group, of which the circumference is formed by a number of flat iſlets linked together by reefs. The principal iſland of the ADMIRALTY *iſlands* (which ſee) is mountainous. The inhabitants are not very black. Their phyſiognomy is agreeable, and differs but little from that of the Europeans; they appear little ſociable, and thieves; they have chiefs who exerciſe great authority; they are armed with darts headed with a volcanic glaſs. They wear at the extremity of the natural parts the ſhell "bulla ovum;" and are otherwiſe entirely naked. The women have only a garment about the waiſt. They live chiefly upon cocoa-nuts, of which theſe iſles have abundance. Their hair is curly, and of a black colour, which they ſometimes redden with ochre mixed with oil; many parts of the body are alſo thus painted, and eſpecially the face. In theſe iſlands it was once hoped to find Lá Perouſe.

The archipelago of *Hermits* is ſcarcely 14 leagues in circumference; it produces Cytherean apples, "ſpondia cytherea," and many fruits of different ſpecies of "Eugenia," all good to eat. The natives appear more mild and pacific than thoſe of the Admiralty iſles, though they ſeem to be more robuſt. They are wholly naked, not even wearing the ſhell. All theſe iſlands, and thoſe about them, are covered with trees. Labillardiere. Pinkerton. The moſt ſoutherly point of New Ireland is ſituated in S. lat. 4° 59′. E. long. 152° 17′.

IRELAND, one of the Bermuda iſlands.

IRELLY, a town of Hindooſtan, in Golconda; 25 miles E. of Hydrabad.

IRENÆUS, in *Biography*, a native Greek, probably of Aſia, and biſhop of Lyons, in Gaul, in the ſecond century. The time of his birth, and the preciſe place of his nativity, cannot be ſatisfactorily aſcertained. Dodwell refers his birth to the reign of Nerva, A.D. 97, and thinks that he did not outlive the year 190. Grabe dates his birth about the year 108. Dupin ſays that he was born a little before the year 140, and died a martyr in 202. Tillemont thinks that he was born about the year 120, and died in 202. It is generally allowed that he was educated in the principles of the Chriſtian religion, and that he was a diſciple of St. Polycarp; and it has been ſuppoſed that he came to Rome with his maſter, in the time of Anicetus, about the year 157, and from thence paſſed into Gaul. He was firſt preſbyter of the church of Lyons, and ſucceeded Pothinus, after his martyrdom in the year 177, as biſhop of that church. Tertullian mentions him as one of the moſt conſiderable writers of the Chriſtian church, and ſays of him that he was "a diligent inquirer of all ſorts of opinions;" meaning, probably, that he had well ſtudied the ſentiments of the heathen philoſophers, and of heretics, as well as the principles of the Chriſtian religion. It has been commonly ſaid that Irenæus died a martyr; but from the ſilence of Tertullian and Euſebius, and others, concerning the manner of his death, it is juſtly argued (ſays Lardner) by Cave, Baſnage, and Dodwell, that this ſuppoſition is not well founded, and that he cloſed his life in the ordinary courſe of nature. He was the author of many works, of which none are now extant beſides his five books "Againſt Hereſies," and fragments of ſome other pieces; and thoſe five books, written by him in Greek, now exiſt only in an ancient Latin verſion, excepting ſome fragments preſerved by Euſebius, and other Greek writers who have quoted them. In this large work "Againſt Hereſies," Irenæus has ſhewn that he was well acquainted with heathen authors, and the abſurd and intricate notions of heretics, as well as with the ſcriptures of the Old and New Teſtament, which he has frequently and copiouſly cited with peculiar and very diſtinguiſhed reſpect. In his writings "we have full, expreſs, and abundant teſtimony to the four goſpels, the acts of the apoſtles, and twelve of Paul's epiſtles. The omiſſion of the epiſtle to Philemon may well be aſcribed to its brevity. He knew the epiſtle to the Hebrews, but was not ſatisfied that it was Paul's. As for the Catholic epiſtles, we have expreſs quotations of the firſt of Peter, and the firſt and ſecond of John; and the reaſon of not quoting the third may be well allowed to be its brevity. But to the epiſtle of James, the ſecond of Peter, and the epiſtle of Jude, there are none, or very obſcure references, hardly any that can be reckoned material. Nevertheleſs, on account of a general paſſage concerning the writings of the apoſtles, it may be queſtioned, whether he did not alſo know the epiſtles of James and Jude. The book of the Revelation is expreſsly aſcribed to John, the diſciple of the Lord. His teſtimony for this book is ſo ſtrong and full, that, conſidering the age of Irenæus, he ſeems to put it beyond all queſtion, that it is the work of John the apoſtle and evangeliſt."

Irenæus appears to have been very humble and modeſt, and agreeable to his name (formed of ειρηνη, *peace*) a lover of peace. This is manifeſt in his letter to Victor, on occaſion of the controverſy about the time of keeping Eaſter. Although his writings may not be free from imperfections, he has given ſuch proofs of learning, integrity, and good ſenſe in the main, that all good judges muſt eſteem him an ornament to the ſect to which he belonged. The works of Irenæus were firſt publiſhed at Baſil by Eraſmus, in 1526, in folio; and they have ſince undergone various impreſſions. The moſt valuable of theſe are that of Grabe, publiſhed at Oxford in 1702, folio; and that of Maſſuet, a Benedictine of the congregation of St. Maur, publiſhed at Paris in 1710, folio. Fabricius. Cave. Dupin. Lardner, in his Works, vol. ii.

IRENARCHA, ειρηναρχης, compoſed of ειρηνη, *peace*, and αρχος, *prince*, from αρχη, *command*, a military officer in the Greek empire, whoſe buſineſs was to provide for the peace, ſecurity, and tranquillity of the provinces.

In Juſtinian's code it is mentioned, that irenarchæ are ſent into the provinces to maintain the public peace, by puniſhing crimes, and puting the laws in execution.

Beſides this there was another irenarcha in the cities, to whom belonged the preſerving of peace, and quelling ſedition among the citizens. This officer was ſometimes called *præfectus urbis*.

The emperors Theodoſius and Honorius ſuppreſſed the office of irenarchæ, on account of their abuſing their truſt, and diſtreſſing and perſecuting the people, inſtead of maintaining peace among them.

IRENE, in *Biography*, empreſs of Conſtantinople, born in the year 752, was an Athenian orphan, but being diſtinguiſhed by her great accompliſhments ſhe was married, at the age of 17, to Leo, ſon of the emperor Conſtantine V. This prince afterwards ſat upon the imperial throne as Leo IV. and at his death, in 780, left his wife guardian of their ſon, Conſtantine VI. then but 10 years old. During his childhood, Irene moſt ably and aſſiduouſly diſcharged, in her public adminiſtration, the duties of a faithful mother; and her zeal in the reſtoration of images, has given her the title and honours of a ſaint, which ſhe ſtill holds in the Greek church. As the young emperor attained the maturity of youth, the ſtruggle for power between him and his mother was carried on with the utmoſt ardour. He liſtened to his favourites, who ſhared his pleaſures, and were ambitious of his power, and was convinced of his right, and of his ability to reign, and determined to reward the ſervices of his mother by a perpetual baniſhment to the iſle of Sicily. She, on the other hand, ſaw through his projects in time to fruſtrate, for the preſent, his plans. The conteſt, however, was not over; and the ſoldiers determining for the prince, he was proclaimed lawful emperor, and his mother was diſmiſſed to a life of ſolitude. Here ſhe excited a powerful conſpiracy againſt Conſtantine, and, in 797, not only dethroned him, but moſt barbarouſly cauſed him to be deprived of his ſight. After this ſhe entered Conſtantinople in a chariot of ſtate, attended by ſeveral patricians as her ſlaves, and aſſumed the reins of empire. "But theſe patricians," ſays Gibbon, "were for the moſt part eunuchs; and their black ingratitude juſtified, on this occaſion, the popular hatred and contempt. Raiſed, enriched, entruſted with the firſt dignities of the empire, they baſely conſpired againſt their benefactreſs: the great treaſurer Nicephorus was ſecretly inveſted with the purple; her ſucceſſor was introduced into the palace, and crowned at St. Sophia by the venal patriarch. In their firſt interview, ſhe recapitulated with dignity the revolutions of her life, gently accuſed the perfidy of Nicephorus, inſinuated that he owed his life to her unſuſpicious clemency, and, for the throne and treaſures which ſhe had reſigned, ſolicited a decent and honourable retreat. His avarice refuſed this modeſt compenſation; and, in her exile in the iſle of Leſbos, the empreſs earned a ſcanty ſubſiſtence by the labours of her diſtaff." In this forlorn condition ſhe died in the ſucceeding year. Her zeal for orthodoxy, and her liberality to the church and the poor, have, in the eyes of eccleſiaſtical hiſtorians, almoſt wholly obliterated her ſavage cruelty and injuſtice towards her ſon. It is univerſally admitted that ſhe was endowed with a ſtrong underſtanding, and with great talents for government. Univ. Hiſt. Gibbon.

IRESINE, in *Botany*, is derived from ειρος, *wool*, becauſe this plant, when it bears fruit, is covered with a ſort of woollineſs. Ειρεσιωνη was the appellation of an olive-branch entwined with wool, ſuch as was cuſtomary for the Greeks to hang up in their houſes, in order to avert famine.—Linn. Gen. 521. Schreb. 687. Mart. Mill. Dict. v. 2. Browne Jam. 358. Swartz Obſ. 376. Juſſ. 88. Lamarck Dict. v. 3. 292. Illuſtr. t. 813.—Claſs and order, *Diœcia Pentandria*. Nat. Ord. *Holeraceæ*, Linn. *Amaranthi*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of two leaves, very ſmall, acute, ſhining. *Cor.* Petals five, ſeſſile, lanceolate, erect; nectary of five ſcales, the ſtamens being interpoſed. *Stam.* Filaments five, erect; anthers roundiſh. Female, *Cal.* and *Cor.* like the male. *Piſt.* Germen ovate, ſuperior; ſtyle none; ſtigmas two, roundiſh. *Peric.* none, except the permanent calyx. *Seeds* few, downy.

Eſſ. Ch. Calyx two-leaved. Corolla of five petals. Male, Nectaries ſeven. Female, Stigmas two, ſeſſile. Seeds woolly.

Obſ. Profeſſor Swartz has remarked that he never found this plant but with hermaphrodite flowers. He is of opinion that the plant deſcribed by Browne might be a diſtinct ſpecies with diœcious flowers. Swartz alſo ſays that *Ireſine* is ſo cloſely allied to *Celoſia*, that it almoſt appears to be a ſpecies of this latter genus.

1. *I. celoſioides.* Linn. Sp. Pl. 1456. (Amarantus panicula flavicante gracili holoſericea; Sloan. Jam. v. 1. 142. t. 90. f. 2.)—A native of Virginia and the Weſt Indian iſlands, particularly Jamaica.—*Root* perennial. *Stems* varying in height from two to ten or twelve feet, jointed, furrowed, divided at the top. *Branches* oppoſite, a little ſpreading. *Leaves* oppoſite, on foot-ſtalks, lanceolate or nearly ovate, acute, ſmooth. *Panicles* terminal. *Flowers* in a ſort of ſpike, ſmall, ovate, whitiſh, ſcaly at their baſe. *Filaments* ſhorter than the corolla; anthers yellow. The *calyx* reſembles a *capſule*, incloſing one or more black ſhining *ſeeds*. A white wool is protruded from between the ſegments when the time of flowering is paſt.

We ſuſpect that another ſpecies of this genus, with narrower leaves, is found in Jamaica.

IRETON, Henry, in *Biography*, a celebrated commander and ſtateſman of the parliamentary party in the civil wars of Charles I., was deſcended of a good family, and brought up to the profeſſion of the law. In the conteſts of the period in which he flouriſhed, Ireton joined the parliament army, and by his ſuperior talents, and the intereſt of Cromwell, whoſe daughter he married, roſe to the high office of commiſſary-general. At the famous battle of Naſeby he was wounded and taken priſoner. By his addreſs he ſoon obtained his liberty, and had a great ſhare in all thoſe political tranſactions which threw the parliament into the power of the army, and afterwards changed the conſtitution from a monarchy to a republic. His councils had great influence with his father-in-law; and his education as a lawyer cauſed him to be employed in drawing up many of the public papers of his party. From his ſuggeſtion, Cromwell ſecretly called, at Windſor, a council of the chief officers, in order to deliberate concerning the ſettlement of the nation, and the future diſpoſal of the king's perſon, and he had a principal hand in framing the ordinance for the king's trial, at which he ſat as one of the judges. Through his inſtigation Fairfax put to death, by martial law, Lucas and Liſle, taken at the ſiege of Colcheſter. This unuſual ſeverity was loudly exclaimed againſt by all the priſoners. Lord Capel reproached Ireton with it; and challenged him, as they were all engaged in the ſame honourable cauſe, to exerciſe the ſame impartial vengeance upon all. Ireton accompanied Cromwell to Ireland in 1649, and in the following year was left by him in that iſland as lord-deputy. Having finiſhed his military career with the capture of Limerick, he was ſeized with a peſtilential diſeaſe in that place, of which he died in November 1651; ſincerely lamented by the republicans, who revered him as a ſoldier, a ſtateſman, and a ſaint. According to Hume, he was "fierce in his nature, though probably ſincere in his intentions; he propoſed, by arbitrary power, to eſtabliſh liberty, and in the proſecution of his imagined religious purpoſes, he thought himſelf diſpenſed from all the ordinary rules of morality, by which inferior mortals muſt allow themſelves to be governed." And again he was "much celebrated for his vigilance, induſtry, and capacity, even for the ſtrict execution of juſtice in that unlimited command which he poſſeſſed in Ireland. He was obſerved to be inflexible in all his purpoſes, and it was believed by many that he was animated with a ſincere and paſſionate love of liberty, and never could have been induced by any motive to ſubmit to the ſmalleſt appearance of regal government. In gratitude for his great public ſervices, the parliament voted an eſtate of 2000*l.* *per ann.* to his family, and honoured him with a magnificent funeral at Weſtminſter Abbey, a circumſtance which, if he could have foreſeen, ſays Ludlow, "he would certainly have made it his deſire that his body might have found a grave where his ſoul left it; ſo much did he deſpiſe thoſe pompous and expenſive vanities; having erected for himſelf a more glorious monument in the hearts of good men, by his affection to his country, his abilities of mind, his impartial juſtice, his diligence in the public ſervice, and his other virtues." Ludlow's Memoirs. Hume Hiſt. Life of Cromwell in the Biog. Brit.

IREW, in *Geography*, a town on the S.E. coaſt of the iſland of Timor. S. lat. 8° 45'. E. long. 126° 3'.

IRGANONG, a town of Hindooſtan, in Baglana; 20 miles S.E. of Saler Mouler.

IRGISKOE, a town of Ruſſia, in the government of Saratov, ſituated on the Irgis, which runs into the Volga, near Volſk; 96 miles E. of Volſk.

IRI, a town of Africa, in the kingdom of Congo.

IRJAB, a town of Candahar, taken by Timur Bec in 1398; 46 miles S.E. of Cabul. N. lat. 33° 50'. E. long. 69° 8'.

IRIARTE Ignacio, in *Biography*, a Spaniſh painter of landſcapes, of whom Murillio ſaid, that he would only aſcribe the beauty of his works to divine inſpiration. He was ſecretary to the academy at Seville, where he died, in 1685.

IRIDES, in *Botany*, the 18th natural order in Juſſieu's Syſtem, and the 8th of his 3d claſs. It is equivalent to the *Enſatæ* of Linnæus, which latter appellation is properly, in our opinion, retained by Mr. Gawler (now Ker), in his illuſtration of this order; ſee ENSATÆ.—Its characters are thus given, the character of the claſs being *monocotyledonous, with ſtamens inſerted into the calyx or corolla.*

Corolla, which Juſſieu terms *calyx*, ſuperior, coloured, tubular at the baſe, its limb in ſix more or leſs deep ſegments, equal or unequal. *Stamens* three, inſerted into the tube, oppoſite to three alternate ſegments of the flower, their filaments diſtinct, or rarely united into a tube embracing the ſtyle. *Germen* inferior; with a ſingle ſtyle and three-fold ſtigma. *Capſule* inferior, of three cells, and three valves, with many, generally roundiſh, ſeeds.

Root either fibrous, tuberous, or bulbous. *Stem* moſtly herbaceous, leafy, rarely almoſt wanting. *Leaves* alternate, ſheathing, moſtly ſword-ſhaped. *Flowers* growing out of ſheaths, either ſolitary, or many together, which ſheaths often conſiſt of two valves.

The leading genera in Linnæus and Juſſieu are *Siſyrinchium*, *Iris*, *Ixia*, *Gladiolus*, *Antholyza*, *Crocus*, &c. which Mr. Ker has greatly ſub-divided. See HESPERANTHIA and GLADIOLUS.

IRIDIUM, in *Chemiſtry*, is a ſimple ſubſtance, and a metal. It was diſcovered by Mr. Smithſon Tennant in 1803, and an account of it was publiſhed in the Phil. Tranſ. for 1804. It appears that, previous to its publication, the ſame diſcovery was made, to a certain degree, by Deſcotils, which was afterwards taken up and enlarged upon by Fourcroy and Vauquelin.

Mr. Tennant found that the ſmall black ſcales exiſting in crude platina, and which are left after the platina has been diſſolved, contained two metals which had not been previouſly noticed. (See PLATINA.) He ſubjected the above ſubſtance to the alternate action of potaſh and muriatic acid, by which means he obtained two ſolutions. The black ſcales are heated to redneſs in a ſilver crucible, with their own weight of potaſh. When the heated maſs has water added to it, the potaſh diſſolves in combination with one of the metals, the ſolution being of an orange colour. The reſiduum being treated with muriatic acid, a ſolution is obtained, which at firſt is blue, then becomes olive green, and ultimately of a red colour, conſiſting of the acid united to the oxyd of the other metal. By this alternate treatment, the oxyd of oſmium, the other metal alluded to, is diſſolved in the potaſh, and the oxyd of iridium in the muriatic acid. The acid ſolution, on being evaporated to dryneſs, affords cryſtals of an octahedral form, which is, no doubt, a pure muriat of iridium. The ſolution of theſe cryſtals is of a deep red colour. When a plate of zinc, or any other metal, having a greater affinity for oxygen than itſelf, is placed in the ſolution, a black powder is precipitated, which, on being heated, becomes white, and puts on metallic luſtre. This metal, like gold and platina, has ſo little attraction for oxygen, that it may be obtained by expoſing the cryſtals of its muriat to a ſtrong heat. In this ſtate it is deemed pure iridium. It is a white metal, having the appearance of platina. Owing to its great infuſibility, we are not acquainted with ſome of its phyſical properties, ſuch as its ſpecific gravity and malleability. It has not been fuſed by Mr. Tennant nor the French chemiſts. It has, however, ſince been made to aſſume the liquid form, by means of the very intenſe heat produced by the large Galvanic battery lately exhibited at the Royal Inſtitution by Mr. Davy. This heat was ſo great, that at the ſame time the earths alumine and zirconia were fuſed, and charcoal was volatilized.

It forms malleable alloys with ſeveral of the metals, a preſumptive proof that it is itſelf malleable. Mr. Tennant found that it did not combine with arſenic, but that it eaſily united with lead; from which, like the noble metals, it may be ſeparated by cupellation. It forms malleable alloys with copper and ſilver. Its alloy, with gold, differs little from pure gold, even when the iridium is in conſiderable quantity. It appears to ſtand next above gold and platina in its affinity for oxygen. It may be inferred, from the change of colour in the acid ſolution, that it admits of at leaſt two ſtages of oxydation. When the metal is in its pure ſtate, it is not acted upon by any acid except the nitro-muriatic, and even this acid, according to Fourcroy and Vauquelin, diſſolves only $\frac{1}{300}$dths its weight. Its combinations with the other acids, and with combuſtible bodies, have not been attended to. See OSMIUM.

IRIJU, in *Geography*, a river of Guiana, which runs into the Atlantic, N. lat. 0° 58′. W. long. 51° 30′.

IRINON. See IRIS.

IRIS, in *Anatomy*. See EYE.

IRIS, *Prolapſus*, or *Procidentia of*, in *Surgery*, denotes a protruſion of a piece of the iris through a wound, or ulcerated opening in the cornea, after the eſcape of the aqueous humour. To this diſeaſe ſeveral writers have applied the name of ſtaphyloma; though, in all probability, the influence of Scarpa will in future confine the latter term to a morbid thickening and projection of the cornea itſelf, a caſe which will be deſcribed in its proper place. See STAPHYLOMA.

The prolapſus of the iris is produced by ſuch wounds and ulcers of the cornea as penetrate the anterior chamber of the aqueous humour, and ſometimes by blows, which have been ſo violent as to rupture the tranſparent membrane inveſting the fore-part of the eye. If the lips of a wound of the cornea (as, for inſtance, thoſe of the inciſion practiſed in the extraction of the cataract, or in opening an hypopium) are not immediately put into reciprocal contact, ſo as to keep the aqueous humour from running out of the anterior chamber, as faſt as it is ſecreted, the iris, drawn by the current of this fluid towards the wound in the cornea, is urged between the lips of the inciſion, and, becoming elongated, projects upon the preceding membrane in the form of a ſmall tumour. The ſame accident happens, when the globe of the eye receives a blow, or is too much compreſſed with a bandage, while a diſunited wound of the cornea exiſts. In ſuch a caſe, likewiſe, the prolapſus of the iris might be produced by a violent ſpaſm of the muſcles of the eye, exceſſive and long-continued vomiting, or repeated coughing. A prolapſus of the iris ariſes even more frequently from ulcers which extend through the cornea, than from wounds of that membrane; and Scarpa aſſigns as a reaſon for this fact, the loſs of ſubſtance always attending the former caſes. The little ſwelling muſt of courſe be of the ſame colour as the iris, namely, brown or grey; and its baſe is ſurrounded by a ſmall opaque circle, formed by the cornea that has been for ſome time ulcerated or divided.

It ſeldom happens that more than one prolapſus of the iris preſents itſelf in the ſame eye, ſince it does not often occur that the cornea is ulcerated or wounded in more than one place. However, we muſt not imagine that the iris is never protruded in ſeveral places at once: Scarpa has ſeen three diſtinct procidentiæ upon the ſame cornea, in conſequence of three ſeparate ulcers of that membrane.

Small as the tumour may be, (and, indeed, it is ſometimes not larger than a fly's head,) it is neverthele ſs apt to give riſe to very ſevere ſymptoms. Nor are we to wonder at this circumſtance, as the iris is ſupplied with numerous blood-veſſels and nervous filaments; and that part of it which is protruded muſt ſuffer exceſſive irritation, as well from the friction of the eye-lids, as from the action of the air, tears, and other matter upon it. Beſides, it is a fact, that the projecting piece of the iris inflames and ſwells ſoon after its protruſion, and conſequently it ſuffers a great deal more from the compreſſion and irritation. The patient at firſt complains of a pain like that of a thorn in the eye, and is alſo afterwards afflicted with an uneaſy ſenſation of tightneſs or conſtriction of the organ. To theſe complaints are ſoon added an inflammation of the conjunctiva and eye-lids, a diſcharge of irritating tears, and an inability to bear the light. The protruded piece of the iris unavoidably drags towards it the reſt of this membrane; and hence the ſhape of the pupil is changed from round to oval, and its ſituation undergoes an approximation to the wound or ulcer, through which the prolapſus of the iris has taken place.

When the diſeaſe has prevailed a conſiderable time, the intenſity of the pain, inflammation, and other ſymptoms, is ſometimes leſſened, inſtead of increaſed. Scarpa informs us of ſuch an example in a man, fifty years of age, who for ten weeks had had a prolapſus of the iris twice as large as a millet-ſeed. The patient bore the diſeaſe with the utmoſt indifference, being merely troubled with a ſlight chronic redneſs of the conjunctiva, and a difficulty in moving the eye-ball with freedom. The little tumour felt to the finger hard, and almoſt callous.

In the treatment of this diſeaſe, ſome practitioners have recommended puſhing the iris back again into its natural ſituation, by means of a whale-bone probe; and, in caſe of this being found difficult of accompliſhment, they have adviſed the wound or ulcer of the cornea to be dilated as far as neceſſary, in the ſame manner as the ſtricture of a ſtrangulated hernia is divided, for the purpoſe of enabling the ſurgeon to reduce the protruded bowels. Others have ſuggeſted irritating the projecting portion of the iris, in order to make it contract and return into its proper place again; and, with the ſame intention, it has been propoſed to expoſe the eye ſuddenly to a very vivid light. The experienced and judicious Scarpa, however, ſets down all theſe methods as ineffectual, if not dangerous; for, ſays he, admitting that we could, in any of theſe ways, replace the iris, without lacerating or hurting it, ſtill there would continue in the wound or ulcer of the cornea an opening, through which the aqueous humour would eſcape, and carry out with it again a fold of the iris.

It cannot be denied that a prolapſus of the iris is a moſt unpleaſant kind of accident; but yet, as we are utterly unpoſſeſſed of any means whereby we can ſtop the eſcape of the aqueous humour through certain wounds and ulcers of the cornea, we ought, according to Scarpa, to conſider the prolapſus of the iris a beneficial occurrence, and preventive of the total deſtruction of the eye, inaſmuch as the protruded fold of this membrane, acting like a plug, prevents the entire loſs of the aqueous humour, which ſoon collects again in the anterior chamber, and hinders a further protruſion of the iris, by ſeparating this membrane from the cornea, and re-eſtabliſhing the equilibrium between it and the other humours of the eye. Hence Scarpa reprobates the foregoing plans as uſeleſs and dangerous.

The principles laid down by this eminent ſurgeon tend to eſtabliſh two chief indications, in caſes of recent prolapſus of the iris: one is to diminiſh the extreme ſenſibility of the piece of the iris projecting out of the cornea; the other is to effect a gradual deſtruction of the protruded portion of the iris, to ſuch a depth as will render the wound or ulcer capable of healing, but not ſo deeply as to break the adheſion which the iris has contracted to the bottom of the breach in the cornea.

Both theſe indications may be fulfilled by touching the projecting part of the iris with the antimonium muriatum, or, with what is ſtill preferable, the argentum nitratum. An aſſiſtant, ſtanding behind the patient's head, is to keep the upper eye-lid raiſed with Pellier's elevator; and the patient is to hold his eye as ſteady as poſſible, by fixing it on one object. While the aſſiſtant raiſes the upper eye-lid, the ſurgeon is to depreſs the lower one with the index and middle fingers of his left hand, and with his right touch the protruded piece of the iris with the argentum nitratum, cut in the ſhape of a crayon. The cauſtic ſhould be preſſed upon the centre of the little tumour, ſo as to form an eſchar of the proper depth. The pain ſuffered at this inſtant is exceedingly ſevere; but it quickly ſubſides, as ſoon as the eye has been bathed with warm milk. The cauſtic expeditiouſly deſtroys the ſenſibility of the protruded part of the iris, and the eſchar prevents the effects of the friction of the eye-lids, and hinders the air and tears from cauſing any irritation of the projecting portion of that membrane. Hence the pricking and painful tenſion, previouſly felt in the eye, are diminiſhed; as likewiſe are the ophthalmy and ſecretion of ſcalding tears.

The benefit thus produced laſts only as long as the eſchar continues adherent to the tumour formed by the iris. Immediately the ſlough is detached, all the annoying complaints again come on, though in a ſomewhat mitigated degree, in conſequence of the projecting part of the iris not being quite ſo prominent as it was before the cauſtic was applied. The eſchar frequently ſeparates on the ſecond or third day; but whenever it happens, the painful ſymptoms recur; and the ſurgeon's duty is to uſe the argentum nitratum again without delay. The application is in this way to be repeated, until the protruded part of the iris is deſtroyed ſo deeply, that it can no longer hinder the wound or ulcer of the cornea from healing.

The employment of the argentum nitratum muſt not be continued, after the prolapſus of the iris has been ſufficiently depreſſed; as we learn from Scarpa, that ſuch a plan would bring on all the pain and inflammation again in an aggravated form. When the little tumour has been levelled as much as the indication requires, the cauſtic is not to be applied again; and the ſurgeon is ſimply to introduce between the eye and eye-lids a collyrium, containing ſulphate of zinc and mucilage of quince-ſeeds, and afterwards inſinuate a ſmall quantity of the following ointment under the eye-lids, every morning and evening:

℞ Adipis ſuillæ ℥ß.
Tutiæ ptt.
Bol. Armen. ſubtiliſſimé pulv. *ā ā* ʒij.
Calcis hydrarg. alb. ʒj. Miſce.

This ointment muſt be at firſt weakened with twice or thrice its quantity of lard.

When the foregoing applications are not too ſtimulating, the ulcer is gradually diminiſhed, and generally quite healed in about a fortnight.

As the union, which takes place in the courſe of the treatment, between the protruded piece of the iris and the internal edges of the wound, or ulcer, of the cornea, always continues after the cure is completed, the pupil muſt for ever remain of an oval ſhape, and a little inclined towards the cicatrix in the cornea. This muſt happen even when the treatment has been as ſucceſsful as poſſible. It is pleaſing, however, to learn from the experienced Scarpa, that ſuch alteration in the ſituation and poſition of the pupil cauſes little or no diminution of the power of ſeeing the moſt minute objects, and occaſions much leſs impairment of the ſight than might be ſuppoſed, unleſs it unfortunately happen that the ſcar in the cornea is in the middle of it. Beſides, we are alſo aſſured by the ſame diſtinguiſhed ſurgeon, that the power of diſcerning things is the leſs injured, inaſmuch as the pupil, which was in the beginning of the diſeaſe narrow and oblong, becomes afterwards more capacious. This fact is likewiſe confirmed by Richter in his Obſ. Chir. faſcicul. i. p. 80.

Scarpa has found the preceding treatment more ſucceſsful than any other, not excepting the method of cutting off the protruded part of the iris with a pair of ſciſſors. This laſt plan, he thinks, is only advantageous when the iris is ſtrongly adherent to the internal lips of the wound or ulcer of the cornea, or when the prolapſus has exiſted a long while, and the projecting portion of the iris has become indurated and callous, while its baſe, conſtricted by the edges of the wound, or ulcer of the cornea, not only adheres to them, but has put on the appearance of a kind of pedicle. Scarpa, indeed, has ſeen one inſtance, where the little tumour fell off of itſelf in conſequence of the compreſſion made upon its neck by the edges of the ulcer of the cornea.

Iris, *Imperforate.* See Pupil, *Cloſure of.*

Iris, in *Botany*, ιρις of the ancient Greeks, ſo named from the various, and ſomewhat concentric, hues of the flower, which give an idea of the rainbow. The modern Greeks call it κρίνος, and the Turks *ſuſen*, both which words are ſynonymous with our *lily*, and the French *lis*, or *fleur-de-lis* —Linn. Gen. 27. Schreb. 36. Willd. Sp. Pl. v. 1. 224. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. v. 1. 115. Sm. Fl. Brit. 41. Juſſ. 57. Lamarck. Illuſtr. t. 33. Gærtn. t. 13.—Claſs and order, *Triandria Monogynia.* Nat. Ord. *Enſatæ*, Linn. *Irides*, Juſſ.

Gen. Ch. *Cal.* Spathas of two valves, ſeparating the flowers, permanent. *Cor.* in ſix deep ſegments, united into a tube by their narrow baſes; each oblong, obtuſe; the three outermoſt reflected, three inner erect and moſt acute. *Stam.* Filaments three, awl-ſhaped, lying on the reflexed ſegments of the corolla, and not half ſo long; anthers vertical, oblong, ſtraight, depreſſed. *Piſt.* Germen inferior, oblong; ſtyle ſimple, cloſely enfolded by the tube of the corolla; ſtigmas three, each with a petal-like, dilated, oblong appendage, keeled on the inſide, furrowed at the outer, lying over each ſtamen, two-lipped, the lower lip ſmall and notched, upper larger, cloven, ſlightly reflexed. *Peric.* Capſule oblong, angular, of three cells and three valves. *Seeds* ſeveral, large, more or leſs compreſſed and angular.

Eſſ. Ch. Corolla in ſix deep ſegments, alternately reflexed, ſuperior. Stigmas with a petal-like two-lipped appendage.

Obſ. Botaniſts have differed about the really efficient part of the ſtigmas of the *Iris.* The whole petal-like expanſion was ſuppoſed by Linnæus and his followers to be the actual ſtigma, or at leaſt they had no preciſe idea of the excluſive action of any particular part. The late Abbé Cavanilles conceived the pollen to be received into a tubular opening between the baſe of each ſtamen and the extremity of the ſtyle, and there to perform its office. Kölreuter and Sprengel, with much more probability, believe the upper or inner ſurface of the ſmall lower lip of the petal-like expanſion, which is glandular in that part, to be the real ſtigma, and the latter has curiouſly explained the mode in which bees convey the pollen to this ſpot. See Sims and Konig's Annals of Botany, v. 1. 412. The ſtigma of ſeveral ſpecies of *Moræa* comes very near that of *Iris*, and there has always been ſome ambiguity between theſe two genera, which we ſhall endeavour to remove when we come to Moræa.

Iris is a large and very natural genus. Tournefort ſubdivided it into ſeveral by the roots, which in ſome ſpecies are tuberous, in others bulbous. Some moreover have the upper ſurface of the reflexed ſegments of the corolla ſmooth, whilſt in others that part is beautifully bearded.

In the *Species Plantarum* of Linnæus are 22 ſpecies; in Syſt. Veg. ed. 14. twice that number, Thunberg, who wrote a diſſertation on this genus, having greatly augmented it. Pallas diſcovered many new ſpecies in his Siberian travels. Willdenow has 54 in all. Mr. Ker differs from the latter in the arrangement of many of them, even Linnæan ones, which he removes to *Moræa*, and he is followed implicitly by Mr. Dryander in the new edition of the *Hortus Kewenſis.* The whole are divided into four ſections.

* *Root thick, ſolid, horizontal. Flowers beardleſs.*

Of this the common Engliſh *I. Pſeud-acorus*, Engl. Bot. t. 578, leſs accurately figured in Curt. Lond. faſc. 3. t. 4, is an example. It grows in watery places, flowering in July, and like every known *Iris* is perennial. The *flower* is bright yellow, ſtreaked with darker lines.

* * *Root thick, ſolid, horizontal. Flowers bearded.*

To this ſection belong many of our garden kinds, as *I. ſuſiana*, Curt. Mag. t. 91, or Chalcedonian Iris, ſo remarkable for its large flower, elegantly pencilled with black: *I. criſtata*, Sm. Spicil. t. 13, found in America: as well as the well-known *I. variegata*, *ſambucina*, *florentina*, and *germanica*, natives of the ſouth of Europe.

* * * *Root knobby. Flowers beardleſs.*

This contains only *I. tuberoſa*, Fl. Græc. Sibth. t. 41, Curt. Mag. t. 531, known by its quadrangular leaves and ſingularly dark flower.

* * * * *Root bulbous. Flowers beardleſs.*

Here are found the pretty *I. Xiphium*, Curt. Lond. t. 686, which decorates many a cottage garden with its ſweet blue and yellow bloſſoms: *I. perſica*, Curt. Mag. t. 1, more delicately coloured: and, to ſome perſons, exquiſitely ſcented, though to others it is ſcentleſs; and *I. Siſyrinchium*, Fl. Græc. Sibth. t. 42. Redout. Liliac. t. 29. The laſt is referred by Mr. Ker to *Moræa.*

Iris, in *Gardening*, contains plants of the fibrous, tuberoſe, and bulbous-rooted, flowery, herbaceous, perennial kinds; of which the ſpecies cultivated are very numerous; but the following are ſome of the principal; the dwarf iris (I. pumila); the Chalcedonian iris (I. ſuſiana); the Florentine iris (I. florentina); the twice-flowering iris (I. biflora); the leafleſs iris (I. aphylla); the variegated iris (I. variegata); the German iris (I. germanica); the elder-ſcented iris (I. ſambucina); the brown-flowered iris (I. ſqualens); the creſted iris (I. criſtata); the trifid-petalled iris (I. tricuſpis); the bulbous-rooted iris (I. xiphium); the common yellow, or water-iris (I. pſeud-acorus); the ſtinking iris (I. fœtidiſſima); the Virginian iris (I. virginica); the various-coloured iris (I. verſicolor); the pale-yellow iris (I. ochrolinea); the ſpring iris (I. verna); the Perſian iris (I. perſica); the graſs-leaved iris (I. graminea); the ſpurious iris (I. ſpuria); the Siberian iris (I. ſibirica); the Martinico iris (I. martinicenſis); the peacock iris (I. pavonia); and the ſnake's-head iris (I. tuberoſa).

The firſt of theſe ſorts has varieties with white flowers; with ſtraw-coloured flowers; with pale-blue flowers; with bluſh-coloured flowers; with yellow variable flowers; and with blue variable flowers.

The ninth ſort has likewiſe varieties with blue ſtandards and purple falls; with pale-purple ſtandards; with white ſtandards; and with a ſmaller flower.

The eleventh ſpecies alſo varies greatly in the ſhape of the larger petals, as well as in the colours, as blue, purple, yellow, white, and ſpotted.

And the twelfth ſort furniſhes varieties with blue flowers; with violet-coloured flowers; with white flowers; with purple flowers; with yellow flowers; with blue ſtandard petals and white falls; with blue ſtandards and yellow falls; with ſtriped flowers; the broad-leaved with blue flowers; the broad-leaved purple flowered; the ſweet-ſcented blue flowered; the ſweet-ſcented purple flowered, with variegated ſweet-ſcented flowers, and the double flowered.

The nineteenth ſort, or Perſian iris, is greatly eſteemed for the beauty and extreme ſweetneſs of its flowers, as well as for its early appearance in the ſpring, being generally in perfection in February or the beginning of the following month, according to the ſtate of the ſeaſon. And Martyn notices that, "like the hyacinth and narciſſus, it will blow within doors in a water-glaſs, but ſtronger in a ſmall pot of ſand, or ſandy loam, and that a few flowers will ſcent a whole apartment."

Method of Culture.—Moſt of the ſorts may be readily increaſed by parting the roots, or ſeparating the off-ſets from the bulbs, and planting them out in the ſituations where they are to flower; the firſt ſort in the autumn, or very early in the ſpring, and the latter in the cloſe of ſummer, when the leaves decay, managing them in the ſame manner as other bulbs. As they increaſe and ſpread rapidly in their roots, they ſhould be divided and taken off every two or three years.

New varieties of the different ſorts may be raiſed from ſeed, by ſowing it in the autumn in a bed of light ſandy mould. The plants come up in the following ſpring, and in the autumn may be tranſplanted where they are to grow. They flower a year or two afterwards in this climate.

The bulbous-rooted ſorts ſucceed beſt in ſuch ſoils as are of the light, ſandy, loamy kind; but will ſucceed in any that are dry.

The laſt ſort anſwers moſt perfectly in ſuch aſpects as are towards the eaſt, the roots being prevented from going too deep in the ground.

As the ſecond ſort is liable to be injured by ſevere winters, a few ſhould be planted in pots to have protection. This ſort is well ſuited for forcing, in houſes for the purpoſe.

When planted in the open ground, it requires a rather dry ſoil and ſituation to ſucceed in a proper manner.

The Cape ſorts ſhould be retained in the dry ſtove, and be propagated and managed in the ſame manner as other bulbous-rooted plants of the ſame kind.

All the ſorts are proper for affording variety in the borders, clumps, and other parts of pleaſure-grounds; and ſome of the more tender ſorts among potted plants of ſimilar growth and habits.

Iris, in the *Materia Medica.* The *Iris florentina*, Florentine orris, or iris, is a native of Italy, and flowers in June; it was cultivated in England by Gerard in 1596, and is now conſtantly propagated by the floriſts; but the roots of the orris produced in this country have neither the odour, nor the other qualities of thoſe of the warmer climates; ſo that for medicinal uſe they are commonly imported from Leghorn. In its recent ſtate, the root is extremely acrid, and when chewed, excites a pungent heat in the mouth, of ſeveral hours' duration. When dried, this acrimony is almoſt wholly diſſipated. The taſte is ſlightly bitter, and the ſmell is agreeable, approaching to that of violets. No eſſential oil has been hitherto obtained from this root; but ſpirituous tinctures of it contain more of its virtues than watery infuſions. The freſh root is a powerful cathartic, and for this purpoſe its juice has been employed in the doſe of a dram and upwards in dropſies. It is now chiefly uſed in its dry ſtate, and ranked as a pectoral or expectorant; though there is no evidence of its expectorant powers; and therefore it is now conſidered as valuable only for the pleaſantneſs of the perfume, and the flavour which it communicates.

The *Iris pſeud-acorus*, *paluſtris*, or *paluſtris lutea*, *Acorus adulterinus*, yellow water-flag, or yellow water flower-de-luce, is common in marſhes, and on the banks of rivers, and rendered very conſpicuous by its large yellow flowers, which appear in the beginning of July. It had formerly a place in the Lond. Pharm. under the name of "Gladiolus luteus." The root has no ſmell, but an acrid ſtyptic taſte, and its juice, ſnuffed up the noſtrils, produces a burning heat in the noſe and mouth, accompanied with a copious diſcharge from theſe organs; and hence it is recommended both as an errhine and ſialagogue. This root is ſuch a powerful aſtringent, that it has been uſed inſtead of galls in the making of ink, particularly in Scotland. For this purpoſe the common people cut ſome of the roots into thin ſlices, and either boil or infuſe them in water till the liquor is highly tinged with blue; they then pour it clear off: and putting into it the blade of a knife, or any other piece of iron, they rub it hard with a rough white pebble, common there, and by degrees the liquor becomes black: they continue rubbing it till it is as deep a black as they require, and it is a tolerable good ink. (Phil. Tranſ. N° 117.) This root has alſo been uſed for the purpoſe of dyeing black; and from this quality it has been ſucceſsfully employed as a medicine for the cure of diarrhœas. When given with this intention, the root is to be well dried; for the freſh root and its juice are ſtrongly cathartic, inſomuch that eighty drops of the latter produced repeated evacuations, after jalap, gamboge, &c. had failed, and by continuing its uſe in an increaſed doſe, it cured an inveterate dropſy. Hence Bergius ſays, "virtus *recent.* hydragoga, pungens: *ſiccat.* adſtringens." The expreſſed juice is likewiſe ſaid to be an uſeful application to ſerpiginous eruptions and ſcrophulous tumours. (Woodv. Med. Bot.) The root of this plant is recommended by Brookes as a remedy for the tooth-ache.

Iris, *Rainbow*, in *Phyſiology.* The word is Greek, ιρις, ſuppoſed by ſome to be derived from ειρω, *I ſpeak*, *I tell*, as being a meteor, that is ſuppoſed to foretel, or rather to declare, rain. See Rainbow.

Iris is alſo applied to thoſe changeable colours which ſometimes appear in the glaſſes of teleſcopes, microſcopes, &c. ſo called from their ſimilitude to a rainbow. The ſame appellation is alſo given to that coloured ſpectrum, which a triangular priſmatic glaſs will project on a wall, when placed at a due angle in the ſun-beams.

Iris is alſo a name given by ſome authors to a peculiar ſpecies of ſprig cryſtal, remarkable for its giving the rainbow colours in reflection. This, however, being a property more or leſs found in all the kinds of ſprig cryſtal, and theſe much reſembling one another, it became applied to ſprig cryſtal in general; and iris, inſtead of being the name of a peculiar ſpecies, was underſtood as a ſynonymous term for common cryſtal.

Iris *Marina*, the *Sea-rainbow.* This elegant appearance is generally ſeen after a violent ſtorm, in which the ſea-water has been in vaſt emotions. The celeſtial rainbow has great advantage over the marine one in the brightneſs and variety of the colours, and in their diſtinctneſs one from the other; for in the ſea-rainbow there are ſcarcely any other colours than a duſky yellow on the part towards the ſun, and a pale green on the oppoſite ſide. The other colours are not ſo bright or diſtinct as to be well determined, but the ſea-rainbows are more frequent and more numerous than the others. It is not uncommon to ſee twenty or thirty of them at a time at noonday. Obſerv. ſur l'Aſie, p. 292.

Iris *Plants, Petrified*, in *Natural Hiſtory*. In Dr. Grew's Catalogue of the Rarities of Greſham College, p. 274, he mentions a petrified iris-root; a ſtone ſomewhat flat, but radiated from the central pith, the poliſhed end of which, when wetted, ſhewed theſe radiations very fine: this extraneous foſſil probably belonged to the coralline tribe, inſtead of being a root. In Dr. Leigh's account of the foſſil plants, found in the coal-pits at Burnley in Lancaſhire, he mentions iris: long narrow leaves, reſembling thoſe of flags, and ſo called in general, are common in coal ſtrata; theſe kinds of leaves in the grit-ſtone quarries in Derbyſhire are often called ſwords, from the reſemblance of their impreſſions in the ſtone to the ſheath of a ſword.

IRISH Sea, in *Geography*, the name of that part of the Atlantic ocean, which is between the coaſts of Ireland and Great Britain.

Irish *Terms*. See Terms.

IRKINEEVA, in *Geography*, a town of Ruſſia, in the government of Tobolſk; 160 miles E.N.E. of Eniſeiſk. N. lat. 58° 50'. E. long. 96°.

IRKUTSK, a town of Ruſſia, and capital of a government, to which it gives name, on the Angara, near the lake Baikal, the ſee of a Greek archbiſhop, and a place of conſiderable commerce; the caravans which trade to China paſſing through it. N. lat. 52° 4'. E. long. 95°.

IRKUTSKOI, a government of Ruſſia, containing all that part of Siberia which lies beyond the 107th degree of eaſt longitude; bounded on the N. by the Frozen ſea, on the E. by the N. Pacific ocean, on the S. by Chineſe Tartary, and on the W. by the governments of Kolivan and Tobolſk. It is the moſt extenſive, but leaſt populous of all the Ruſſian governments, and is divided into the four provinces of Irkutſk, Nertchinſk, Yakutſk, and Ochotſk, ſo called from the four principal towns.

IRMA-HISSAR, a town of Aſiatic Turkey, in Natolia; 40 miles S.E. of Caſtamena.

IRNEE, a town of Hindooſtan, in the circar of Mahur; 38 miles N. of Mahur.

IRNERIUS, in *Biography*, ſometimes called Wernerius, a celebrated juriſt of the twelfth century, was probably born at Bologna. He firſt taught philoſophy in that city, and acquired much diſtinction by being the firſt who opened a ſchool for lectures in the Roman law in Italy, after its interruption by the invaſions of the barbarous nations. He alſo compoſed gloſſes upon the Roman law, not only upon the Code and Inſtitutions, but upon the Digeſt. He obtained great reputation by his labours; and the name of Wernerius, in a plea of the counteſs Matilda, in 1113, ſtands before that of any other of the lawyers. The ſame circumſtance is found in the pleas of the emperor Henry IV. from the year 1116 to 1118, which proves that he attended the court of that monarch in his profeſſional capacity. In 1118 he accompanied Henry to Rome, where he was employed to perſuade the Romans to the election of the anti-pope Burdin. He died about the year 1150; and is ſaid to have introduced the degree of doctor into the univerſities. Bayle.

IRON, *Eiſen*, Germ. *Fer*, Fr. *Ferrum*, Lat. *Ferro*, Ital. *Jeren*, Swed. *Jernet*, Dan. *Vas*, Hung. *Hierro*, Span. *Jalazo*, Ruſſ. *Ferro*, Port. Σιδηρος, Gr. בַּרְזֶל (*Bharzel*, or *Varzel*), Heb. *Mars*, Alchem.

The uſe of this metal is of very high antiquity, though not ſo remote, there is reaſon to believe, as that of either gold, ſilver, or copper. The inferior brilliancy of its colour may, perhaps, in ſome degree, account for this circumſtance; as well as the greater ſkill required to obtain it from its ores, and convert it to the purpoſes of art. It is mentioned frequently in the pentateuch; and was, in the time of the celebrated writer of that hiſtory, employed for the fabrication of ſwords, knives, and various other ſharp-edged inſtruments. We may form ſome eſtimate of the value that was then attached to it, from an expreſſion in the eighth chapter of Deuteronomy, where Moſes tells the Iſraelites, in his deſcriptive eulogy of the Land of Promiſe, that it is "a land whoſe ſtones are iron, and out of whoſe hills" they may "dig braſs." A circumſtance, illuſtrative of the ſame fact, at a later date, is furniſhed about 400 years ſubſequent to that period, when Achilles propoſed a ball of iron as one of the prizes to be diſtributed to the victors at the games inſtituted in honour of Patroclus. (Ιλιαδος, Ψ.) The art of working it appears, in the courſe of a few ſucceeding centuries, to have arrived at conſiderable perfection; for, according to the information of Herodotus (Clio xxv.), a ſaucer of the metal, very curiouſly inlayed, was preſented by Alyattes, king of Lydia, to the Delphic oracle, which, he ſays, "is of ſurpriſing workmanſhip, and as worthy of obſervation as any of the offerings preſerved at Delphi." The durability of iron, and its indiſpenſible aſſiſtance in the preparation of every other metal, make it one of the moſt valuable poſſeſſions that has been bequeathed to the uſe of civilized man. "Without it," obſerves Fourcroy, "agriculture could not have exiſted, nor could the plough have rendered the earth fertile. The philoſopher, while he ſtudies the progreſs of the human underſtanding, and compares the fortune and ſtate of the different nations eſtabliſhed on various portions of the ſurface of the globe, will remark, that their iron-works ſeem, in ſome meaſure, to be proportioned to their intelligence, to the advancement of reaſon amongſt them, and the degree of perfection to which the arts have arrived. When we conſider it in this point of view, as the agent by which men, in the variety of its uſes, and the numerous wants it ſupplies, acquire enjoyments which would be unknown to them if they did not poſſeſs theſe products of their induſtry, iron muſt ſingularly contribute to extend their ideas, to multiply their knowledge, and to conduct their ſpirit towards that perfectibility, which nature has given no leſs, as the character of the human ſpecies, than as the ſource of all the advantages it can enjoy." Syſt. vol. 6.

Iron is a malleable and ductile metal, of a blueiſh-white colour; is ſuſceptible of a very high poliſh, and of the ſpecific gravity, according to the tables of Muſchenbroeck, Swedenburg, and Briſſon, of from 7.600 to 7.895, and even 8.166. It is ſoluble in moſt acids, and precipitable from its combination with them, by various re-agents, which will be hereafter pointed out. With the Pruſſic acid it forms that beautiful pigment known in commerce, and the arts, by the name of *Pruſſian blue;* and in a variety of other ways, conſtitutes the baſis of many valuable preparations. The combinations under which it is exhibited to us in nature are detailed in the following ſection.

§ 1. *Ores of Iron.*

Sp. 1. *Native iron. Gediegen-eiſen. Fer natif. Ferrum nativum.*

Its colour is ſteel-grey, paſſing to ſilver-white. Occurs only in a ramoſe form; the maſſes alluded to by Brochant and others being now conſidered of meteoric origin. Surface gliſtening. Internally it is intermediate between gliſtening and glimmering; and its luſtre metallic. Fracture hackly. It is rather ſoft, is completely malleable, and flexible without being elaſtic. Sp. gr. 7.8.

A ſpecimen from a mine near Kamſdorf, in Saxony, yielded, according to Klaproth,

Iron	92.5
Lead	6.0
Copper	1.5
	100.0

The varieties which contain nickel are meteoric.

It is found in detached maſſes, which are uſually covered with an oxyd of a browniſh colour.

The places of its occurrence are Kamſdorf and Eibenſtock, in Saxony; Oulle, near Grenoble, in France; and ſome others.

Sp. 2. *Iron Pyrites. Schwefelkies. La Pyrite Sulfureuſe. Ferrum Mineraliſatum Pyrites.*

This very abundant mineral is divided by Werner into five ſubſpecies, common, radiated, capillary, hepatic, and cellular.

Subſp. 1. *Common Pyrites.*—Colour bronze-yellow, paſſing ſometimes to gold-yellow. Occurs maſſive and diſſeminated. It is very frequently alſo cryſtallized. Its forms are the cube, either perfect or truncated, the octahedron, dodecahedron, and ſometimes, though very rarely, the icoſahedron. The cryſtals are in general ſmall; except the cube, which is middle-ſized. Their ſurface is either ſmooth or ſtreaked, and varies from glimmering to ſplendent. Internally it is ſhining or gliſtening; and its luſtre metallic. Fracture even; ſometimes conchoidal. It is hard, brittle, rather eaſily frangible, and heavy. Sp. gr. from 4.600 to 4.831.

Expoſed to the blow-pipe, it exhales a ſtrong odour of ſulphur, and burns with a blueiſh flame. It afterwards paſſes into a globule, obedient to the magnet, of a browniſh colour; and treated with glaſs of borax, communicates to it a tint of a dark dirty green. It appears to be compoſed of about 52.5 ſulphur, and 47.5 iron.

Its occurrence is almoſt univerſal, both with reference to geographic arrangement, and the mineral formations in which it is preſented.

Subſp. 2. *Radiated Pyrites.*—Colour bronze-yellow, of a paler hue than the preceding; paſſing ſometimes to braſs-yellow. Surface tarniſhed. Is found maſſive and reniform, alſo uniform, globular, and cryſtallized. The ſhape of its cryſtals is cubic, and octahedral; the latter being ſometimes truncated on the angles. The external luſtre varies between ſplendent and gliſtening. Internally it is gliſtening and glimmering. Fracture uſually radiated; ſometimes uneven and fibrous. Fragments uniform. Occurs in coarſe and large-grained diſtinct concretions, alſo lamellated and columnar. It is hard, brittle, very eaſily frangible, and heavy, but leſs ſo than the foregoing ſubſpecies. Emits a ſulphureous odour when ſtruck, or rubbed. Sp. gr. from 4.698 to 4.775.

Before the blow-pipe it exhibits the ſame appearances as common pyrites, and is conſtituted of about 54 parts of ſulphur, and 46 of iron.

It is conſiderably rarer than the preceding, and is found in veins, particularly thoſe which contain lead or ſilver.

The places of its occurrence are, amongſt others, Cornwall and Derbyſhire, in England; Arendal, in Norway; and in various diſtricts of Suabia, Saxony, and Bohemia.

Subſp. 3. *Capillary Pyrites.*—Colour bronze-yellow, inclining more or leſs to ſteel-grey. Occurs in very fine capillary cryſtals. Luſtre ſhining or gliſtening; metallic. Brittle, and in a ſmall degree flexible. The ſmallneſs of its cryſtals prevents a more particular account being given of its character.

Its chemical properties are the ſame as thoſe of common pyrites.

It is never met with but in very ſmall quantity, and is the moſt rare of all the varieties of pyritic iron. It is moſt uſually accompanied with quartz, lead-glance, or galena, and fluor and calcareous ſpar.

Is found at Annaberg, Schneeberg, and Johanngeorgenſtadt, in Saxony; at Andreaſberg, in the Hartz; and other places on the continent of Europe. The capillary pyrites, according to Klaproth's analyſis, is not an iron-ore, but nickel, mixed with a ſmall portion of cobalt and arſenic.

Subſp. 4. *Hepatic Pyrites.*—Its colour is intermediate between bronze-yellow and ſteel-grey, paſſing ſometimes entirely to the latter. On expoſure, the freſh fracture changes to a brown. It is found maſſive, and under a variety of other forms, as ſtalactitic, cellular, &c. alſo cryſtallized. The ſhape of its cryſtalline arrangement is priſmatic, pyramidal, and tabular, each with ſix ſides. Luſtre glimmering, inclining to gliſtening; metallic. Fracture even, paſſing ſometimes to uneven and imperfectly conchoidal. Fragments indeterminate, ſharp-edged. Hard, rather inclining to ſoft, brittle, eaſily frangible, and heavy.

This ſubſpecies is ſaid to contain arſenic. It decompoſes very eaſily on expoſure to air, which renders it very difficult to be retained in mineralogical collections.

It occurs only in veins, and in thoſe principally which contain red ſilver ore, galena, blende, common pyrites, and ſparry iron-ſtone. The earthy minerals that acccompany it are, for the moſt part, quartz, ſulphat of baryt, and calcareous and fluor ſpar.

It is found in Derbyſhire; at Joachimſthal in Bohemia; Annaberg and Freyberg in Saxony; and in various parts of Sweden, Norway, and Siberia.

Subſp. 5. *Cellular Pyrites.*—Colour bronze-yellow, a good deal inclining to ſteel-grey. Tarniſhes by expoſure, and then becomes of a grey tint. Occurs maſſive; but its moſt common appearance is cellular. Cells druſy on the ſurface. Luſtre gliſtening. Fracture conchoidal. Fragments ſharp-edged, indeterminate. Brittle, and in a ſlight degree flexible.

Its occurrence is in veins, where it is accompanied, according to the ſtatement of profeſſor Jamieſon, with hepatic and common pyrites, lead-glance, ſparry iron-ſtone, nickel, iron-ochre, brown-ſpar, heavy-ſpar, fluor-ſpar, and quartz.

Is found at Johanngeorgenſtadt, in the electorate of Saxony.

Sp. 3. *Magnetic Pyrites. Magnetkies. La Pyrite magnetique. Ferrum mineraliſatum magnetico-pyritaceum.*

Colour copper-red, inclining much to bronze-yellow, and even to pinchbeck-brown. Tarniſhes on expoſure, becoming then brown. Occurs maſſive and diſſeminated: has never been found under any other form. Internal luſtre gliſtening, or ſhining; metallic. Fracture uneven, and ſometimes imperfectly conchoidal: when the latter, it has a luſtre bordering on ſplendent. Fragments indeterminate, rather blunt-edged. Intermediate between hard and ſemi-hard. It is brittle, eaſily frangible, and very heavy. Is attracted by the magnet. Sp. gr. 4.516.

Treated by the blow-pipe, it emits a ſlight ſulphureous odour, and melts with great facility into a greyiſh-black globule, which is attracted by the magnet, and colours borax black. It is compoſed of 36.5 ſulphur, and 63.5 iron.

It occurs only in the claſs of rocks denominated primitive; and there only in beds. The minerals which uſually accompany it are galena, magnetic iron-ſtone, arſenical pyrites and tin ſtone; with alſo quartz, garnet, ſtrahlſtein, hornblende, &c.

Its geographic diſtribution is rather extenſive. Amongſt many other inſtances, the following may be enumerated: Moel Elion, in Caernarvonſhire, North Wales; Geyer, Breitenbrunn, &c. in Saxony; Bodenmais, in Bavaria; and in different parts of Norway and Siberia.

Sp. 4. *Magnetic Iron-ſtone. Magneteiſenſtein. Le fer magnetique. Ferrum magnes.*

Werner divides this into two ſubſpecies; namely, common magnetic iron-ſtone, and magnetic iron-ſand.

Subſp. 1.—*Magnetic Iron-ſtone.*—Colour iron-black, inclining ſometimes to perfect black, and ſometimes to ſteel-grey. Occurs maſſive, diſſeminated and cryſtallized. The form of its cryſtals is the cube, perfect or truncated; the octahedron, which is alſo ſometimes varied by truncation; the garnet dodecahedron, and the rectangular four-ſided priſm, terminated by four planes, placed on the lateral edges, as in the hyacinth. Theſe cryſtals vary much in ſize. The dodecahedrons and octahedrons have their faces ſmooth; but the planes of the four-ſided priſm are tranſverſely ſtreaked. Luſtre externally ſhining; internally varying from glimmering to ſplendent. Fracture ſmall and fine-grained, uneven, approaching ſometimes to ſmall conchoidal, and imperfect foliated. Fragments indeterminate, rather ſharp-edged. Occurs ſometimes in granular diſtinct concretions. It is ſemi-hard, paſſing to hard; brittle; when in cryſtals difficultly frangible, and heavy. Sp. gr. 4.200 to 4.939. It is attracted by the magnet; and is itſelf alſo magnetic.

Before the blow-pipe it becomes brown, and imparts a dark-green colour to borax. It is ſuppoſed to be an oxyd of iron, nearly in a ſtate of complete purity.

This ſpecies is very common in primitive mountains, eſpecially in thoſe of gneiſs and micaceous ſchiſtus. In theſe ſituations it arranges itſelf in beds; but ſometimes compoſes the entire maſs of diſtinct mountains. The fletz, or ſecondary formations, as they are termed, are not free from it. It occurs in greenſtone at Taberg; in hornblende in Smoland, and in baſalt near Eiſenach. It is uſually aſſociated with common hornblende, garnet, and granular limeſtone. Sometimes with actinote, aſbeſt, &c.; but is moſt frequently found in the vicinity of magnetic pyrites, arſenical and copper pyrites, and common pyrites.

It is found in one of the Shetland iſles; in Bohemia, Hungary, Saxony, Italy, France, Switzerland, Siberia, and South America. Is very abundant in Sweden, where it is employed for the manufacture of the iron imported to this country for the ſupply of the Sheffield market.

Subſp. 2. *Iron-ſand.*—Colour deep iron-black, which paſſes ſometimes to aſh-grey. Occurs in angular or roundiſh grains; and alſo in ſmall octahedral cryſtals. Surface rough and feebly glimmering. Internal luſtre ſhining, metallic. Fracture perfect conchoidal. Fragments indeterminate, ſharp-edged. Streak greyiſh-black. Semi-hard, brittle, eaſily frangible, and heavy. Sp. gr. 4.600. Strongly attracted by the magnet.

Its chemical characters are as the foregoing ſubſpecies.

It occurs in the beds of rivers; and alſo imbedded in the rocks of baſalt and wacke.

Is met with in the river Elbe, near Schandau, in Saxony; imbedded in floetz-trap, in Bohemia; and is found alſo at St. Domingo, Guadaloupe, in Norway, France, the Tyrol, Greenland, &c.

Sp. 5. *Iron-glance. Eiſenglanz. Le fer ſpeculaire. Ferrum mineraliſatum ſpeculare.*

This is alſo divided into two ſubſpecies; common iron glance, and micaceous iron-ore, or, as it is called by profeſſor Jameſon, iron-mica.

Subſp. 1. *Common Iron-glance.*—Colour ſteel-grey of greater or leſs intenſity, and ſometimes reddiſh. It occaſionally paſſes into iron-black. Surface very often tarniſhed, and beautifully irideſcent. Occurs maſſive, diſſeminated, and cryſtallized. The form of its cryſtals is various. The moſt common is the rhomboidal parallelopipedon; the cube, formed by the truncation of a double three-ſided pyramid, and having three triangular faces inſtead of two of its angles oppoſite, and octagonal plates bounded by linear trapeziums, ſix in number, inclined alternately to different ſides. Planes of the cryſtals ſometimes ſmooth, and ſometimes ſtreaked. Externally it varies from glimmering to ſplendent; internally from gliſtening to ſplendent; luſtre metallic. Fracture compact and foliated. The compact varieties are uneven, and ſometimes ſmall conchoidal. The foliated have a fourfold rectangular cleavage. Fragments octahedral or pyramidal; ſometimes indeterminate. Edges rather blunt. Generally unſeparated. Gives a deep cherry-red ſtreak. It is hard, opaque, brittle, more or leſs eaſily frangible, and heavy. Sp. gr. 5.0116 to 5.218. It is magnetic, but leſs ſo than the preceding ſpecies.

Before the blow-pipe it is infuſible, alone; but becomes white when heated on charcoal; and yields a dirty yellow-coloured ſcoria, with borax. Stated by Kirwan to contain from 60 to 80 *per cent.* of iron.

This ſpecies appears to be confined to primitive, and the claſs called tranſition mountains. It has never been found in thoſe of ſecondary formation. Its occurrence is in beds and veins, where it is uſually accompanied with magnetic iron-ſtone, common pyrites, compact red iron-ſtone, hornſtone, and quartz.

Sweden yields it very abundantly; as alſo does Norway. Some of the fineſt ſpecimens are from the iſle of Elba, where the ore is ſaid to have been worked for upwards of three thouſand years. It occurs in Bohemia, Saxony, Switzerland, France, England (in Lancaſhire and Cumberland), Hungary, South America, Siberia, &c.

The Engliſh ſpecimens occur in cavities in compact red iron-ſtone. The cryſtals are uſually ſmall; and the luſtre of their ſurface is particularly ſplendent.

Subſp. 2. *Iron-mica.*—Colour iron-black, paſſing ſometimes to ſteel-grey, and ſometimes to deep-red. The latter is rather the colour of it, when held under the form of thin plates, between the eye and the light. Occurs maſſive, diſſeminated, and cryſtallized. When the latter, it appears in thin tables with ſix ſides. Surface ſmooth and ſplendent. Internally it is alſo ſplendent, and its luſtre metallic. Fracture perfect curved foliated; cleavage ſimple. Fragments ſometimes indeterminate, and ſometimes tabular. The maſſive varieties occur in granular diſtinct concretions. Thin plates of it are tranſlucent. Its ſtreak is deep cherry-red. It is ſemi-hard, brittle, very eaſily frangible, and heavy. Sp. gr. 4.50 to 5.07.

Before the blow-pipe it exhibits the ſame appearances as the preceding ſubſpecies, except in communicating an olive-green tinge to borax. The proportion of iron which it yields is from 70 to 80 *per cent.*

It is excluſively confined to primitive mountains, and for the moſt part to thoſe of a newer formation. It is found, like iron-glance, in beds and veins, and is accompanied with other ores of the metal: calcareous and fluor ſpar, quartz, hornſtone, &c.

Its geographic diſtribution is rather extenſive. It occurs near Dunkeld, in Perthſhire; at Dartmoor, in Devonſhire;

in one of the Shetland iſles; in Norway, Sweden, Ruſſia, France, iſle of Elba, and many diſtricts of Germany.

Sp. 6. *Red Iron-ſtone. Roth-eiſen-ſtein. La mine de fer rouge. Ferrum ochraceum rubrum.*

Werner has divided this into four ſubſpecies, which profeſſor Jameſon, in conformity with the principles of the Wernerian nomenclature, has denominated red iron-froth, ochry-red iron-ſtone, compact red iron-ſtone, and red hematite.

Subſp. 1. *Red Iron-froth.*—Colour deep cherry-red, ſometimes blood-red and browniſh-red, and even inclining to ſteel-grey. Uſually friable. Occurs ſometimes maſſive and diſſeminated; and is compoſed of ſcaly parts which ſoil conſiderably. Luſtre between glimmering and gliſtening; ſemi-metallic. Is greaſy to the touch, and moderately heavy.

Expoſed to the blow-pipe alone, it blackens without melting, and communicates a bright green colour to borax. According to Hauy, it is conſtituted of

Iron	66.
Oxygen	28.5
Silex	4.25
Alumine	1.25
	100.

It occurs generally in veins in primitive and tranſition mountains, accompanied with other ores of iron, copper pyrites, quartz, barytic ſpar, &c.

Although a rare variety of this metal, it is found rather plentifully in the neighbourhood of Ulverſtone, Lancaſhire, and is alſo met with in Cornwall. It occurs too in Norway, the Hartz, Saxony, Sileſia, Salzburg, Hungary, and South America.

Subſp. 2. *Ochry-red Iron-ſtone, or Red Ochre.*—Colour varies between blood-red and browniſh-red. Occurs ſometimes maſſive and diſſeminated, ſometimes ſuperficial, or coating other ores of the metal, but moſt uſually friable. Luſtre faintly glimmering, or dull. Fracture earthy. Fragments indeterminate, blunt-edged. Feels meagre. Soils more or leſs ſtrongly. Is not very brittle. Eaſily frangible, and rather heavy. Sp. gr. 2.952.

It is rarely found alone; being generally accompanied with other ſpecies of iron-ore, and particularly with compact red iron-ſtone, and red hematite. It occurs in veins; and is diſtributed nearly as the two following ſubſpecies.

Subſp. 3. *Compact red Iron-ſtone.*—Colour between browniſh-red and dark ſteel-grey, paſſing ſometimes to blood-red. Occurs maſſive, diſſeminated, and in various imitative forms, as reniform, cellular, &c. It is ſometimes found cryſtallized, and appears either in cubes, or four-ſided pyramids, the latter of which are truncated on their ſummits. The cube is found both perfect and truncated. Surface of the cubes ſmooth; of the pyramids rough and dull. Internal luſtre between glimmering and dull; ſemi-metallic. Fracture for the moſt part even. It ſometimes, however, paſſes into coarſe-grained, uneven, and large conchoidal. Fragments indeterminate, rather ſharp-edged. Streak blood-red. Between hard and ſemi-hard. Somewhat brittle, and more or leſs eaſily frangible, heavy. Sp. gr. 3.423 to 3.76.

It aſſumes a darker colour before the blow-pipe; but is infuſible, even with the aſſiſtance of borax. This re-agent, however, is tinged of a yellowiſh-green by it.

Occurs in beds and veins with red hematite and the preceding ſubſpecies; and is alſo accompanied with quartz, red-jaſper, and hornſtone.

It is found very abundantly in Lancaſhire; in the Hartz, Saxony, Bohemia, Heſſia, Siberia, and France.

It is frequently ſmelted in this country; and principally in thoſe works which fabricate the variety of iron deſcribed in the ſucceeding part of this article, under the name of *forge-pig.* The richer ores, in fact, are incapable of yielding the moſt highly carbonized deſcriptions of iron; partly, perhaps, becauſe they contain too little earthy matter to afford a ſufficiently plentiful *cinder;* and partly becauſe their reduction is too immediate.

Subſp. 4. *Red Hematite.*—Colour intermediate between browniſh-red and ſteel-grey; paſſing ſometimes intirely into one or other of them, and even into blood-red. It is from the latter variety that the name of hematite (from αιμα, *ſanguis,*) is derived. Occurs maſſive and reniform; alſo ſtalactitic, globular, uniform, &c. External ſurface rough and glimmering. Internally gliſtening, paſſing into glimmering; luſtre ſemi-metallic. Fracture always fibrous. Fragments uſually wedge-ſhaped; ſometimes ſplintery and indeterminate. In angulo-granular diſtinct concretions. Streak a bright blood-red. Hard, inclining to ſemi-hard. Rather difficultly frangible. Brittle, and very heavy. Sp. gr. 4.74 to 5.005.

It exhibits the ſame chemical characters as the foregoing ſubſpecies, and yields in the large way about 60 *per cent.* of metal.

According to the recent analyſis of M. D'Aubuiſſon, who has publiſhed a very intereſting memoir in the 75th volume of the "Annales de Chimie," on the chemical conſtitution of certain iron ores which appear to have water as an eſſential ingredient, this mineral is compoſed of

Peroxyd of iron -	90
Silex - -	2
Lime - -	1
Volatile matter -	3
Loſs - -	4
	100

The ſpecific gravity of the ſpecimens here ſubmitted to examination was 4.8. Another ſpecimen, the ſpecific gravity of which was 5.0, yielded the following reſult:

Peroyxd of iron -	94
Silex - -	2
Water - -	2
Loſs - -	2
	100

Each of the above preſented a trace of manganeſe, and the latter a ſimilar evidence of lime.

Its geognoſtic ſituation is ſimilar to the laſt.

Lancaſhire yields it very plentifully, as well as the neighbouring parts of Cumberland. It is found, too, in conſiderable abundance in Saxony; and in Bohemia, France, Sileſia, the Hartz, Siberia, &c.

It is one of the moſt common varieties of iron ore, and is very frequently employed in the ſmelting furnace.

Sp. 7. *Brown Iron-ſtone. Brown Eiſenſtein. La mine de fer brune. Ferrum ochraceum brunum.*

This, like the preceding, is divided into four ſubſpecies, which have the ſame leading diſtinctions. They conſiſt of brown iron-froth, ochry-brown iron-ſtone, compact brown iron-ſtone, and brown hematite.

Subſp. 1. *Brown Iron-froth.*—Colour varying between clove-brown and ſteel-grey. Occurs maſſive, ſuperficial, and frothy. Is compoſed of ſcaly particles, which are gliſtening, and have a metallic luſtre. Fragments indeterminate, blunt-edged. Intermediate between friable and ſolid. Soils ſtrongly. Feels greaſy to the touch. Is very ſoft, light, and ſometimes even ſwimming.

It blackens before the blow-pipe without melting, and communicates a yellowiſh-green colour to borax.

It is generally found coating compact brown iron-ſtone, and brown hematite.

One of the Shetland iſlands affords it; and it occurs alſo in Saxony, the Hartz, Norway, Carinthia, Bareuth, Carniola, and Stiria.

Subſp. 2. *Ochry-brown Iron-ſtone.*—Colour yellowiſh-brown, inclining to ochre yellow. Occurs maſſive and diſſeminated. Between ſolid and friable. Fracture earthy. Internally it is dull. Fragments indeterminate, blunt-edged. Soils conſiderably. Is more or leſs coherent, and heavy.

Imparts an olive-green colour to borax.

It accompanies the other ſubſpecies; and is found in Norway, Saxony, Bohemia, Bavaria, and Salzburg.

Subſp. 3. *Compact Brown Iron-ſtone.*—Colour clove-brown of various intenſities, paſſing ſometimes to yellowiſh-brown. Occurs maſſive, diſſeminated, and in various imitative forms, as ſtalactitic, reniform, cellular, dendritic, &c. It ſometimes, alſo, appears in pſeudo-cryſtals, of which the cube, rhomb, and lens have been particularized. Madrepores and corallines, too, have it frequently for their baſe; as well as other extraneous foſſils. Internally it is dull, or very rarely glimmering. Fracture uſually even, ſometimes earthy and ſmall-grained uneven, and conchoidal. Fragments indeterminate, edges more or leſs blunt. Streak bright yellowiſh-brown, bordering on ochre-yellow. Is ſemi-hard, inclining to hard. Rather brittle. Eaſily frangible, and heavy. Sp. gr. 3.4771 to 3.551.

It darkens before the blow-pipe, in conſequence of the loſs of oxygen, and becomes magnetic. Borax receives an olive-green colour from it.

The proportion of its ingredients, as ſtated by M. D'Aubuiſſon, in the 75th volume of the "Annales de Chimie," is as follows:

	From Bergzabern.	From Vicdeſſos.	From Voighitberg.
Peroxyd of iron -	84	81	69
Peroxyd of mangaueſe	1		3
Silex - -	2	4	10
Alumine - -			3
Volatile matter -	11	12	13
Loſs - -	2	3	2
	100	100	100

The ſpecific gravity of the ſpecimen from Vicdeſſos was 3.4.

It is always accompanied with ſome of the other ſubſpecies; and frequently with quartz, calcareous and heavy ſpar, and pyrites.

Occurs in Mainland, one of the Shetland iſles; the Hartz, Saxony, Sileſia, Bohemia, Suabia, the Tyrol, France, Carinthia, &c.

Subſp. 4. *Brown Hematite.*—Its colour, internally, is clove-brown, which paſſes to yellowiſh-brown, and browniſh-black. It is exhibited under a great variety of other ſhades, as blueiſh or iron-black, pinchback-brown, bronze-yellow, and ſometimes irideſcent. Occurs rarely maſſive; uſually in ſome of the imitative forms before ſpoken of. It is ſometimes found in pſeudo-cryſtals of a pyramidal ſhape, with ſix acute-angled ſides. Surface ſometimes ſmooth, and ſometimes rough and druſy. Luſtre ſhining or gliſtening. Internally it is from glimmering to gliſtening; intermediate between ſilky and reſinous. Fracture fibrous, paſſing ſometimes to ſmall conchoidal. Fragments uſually ſplintery or wedge-ſhaped; rarely indeterminate. Occurs in diſtinct concretions. Streak yellowiſh-brown. Opaque. Semi-hard. Brittle. Very eaſily frangible, and heavy. Sp. gr. 3.789 to 3.951.

It blackens before the blow-pipe, but does not melt. With borax it enters into ebullition, and produces a dirty yellow-coloured compound.

Its conſtituent parts, according to M. D'Aubuiſſon, whoſe analyſes were generally repeated two or three times, are as below ſtated:

	From Bergzabern.	From Vicdeſſos.
Peroxyd of iron - -	79	82
Peroxyd of mangaueſe -	2	2
Silex - - -	3	1
Volatile matter - -	15	14
Loſs - - - -	1	1
	100	100

The ſpecific gravity of the former was 3.8, and of the latter 3.9. The ſpecimen from Vicdeſſos afforded a ſlight trace of alumine.

It occurs in the neweſt primitive, tranſition, and ſecondary mountains; but moſt frequently in the two latter, where it is found lining cavities in veins or beds. Its uſual attendants are black and ſparry iron-ſtone, calcareous ſpar, brown and heavy-ſpar, and ſometimes, though rarely, quartz.

It is found in Voightland, the Fichtelgebirge, Franconia, Heſſia, and Naſſau.

This ſpecies, which is ſo very abundantly diſtributed in the German ſtates, is of rare occurrence either in Sweden, Ruſſia, Norway, or England. In the former, it furniſhes materials for very extenſive iron-works; and the wrought-iron produced from it is very valuable.

Sp. 8. *Sparry iron-ſtone. Spath eiſenſtein. Le fer ſpathique. Ferrum ochraceum ſpatiforme.*

Colour yellowiſh-grey, which paſſes into yellowiſh-brown, clove-brown, and blackiſh-brown. It tarniſhes on expoſure either to the air or heat, and then becomes brown or black, and ſometimes irideſcent. Occurs maſſive, diſſeminated, and cryſtallized. Its cryſtals are either rhombs, lenſes, octahedrons, or garnet-dodecahedrons. They are ſeldom large or very ſmall; commonly middle-ſized and ſmall. Their ſurface is ſometimes ſmooth, ſometimes druſy, and a little rough. Internally it varies from ſplendent to glimmering; luſtre pearly. Fracture foliated. Cleavage triple. Fragments rhomboidal. Occurs in granular diſtinct concretions. The light-coloured varieties are tranſlucent, eſpecially on the edges: but the dark-coloured opaque. The former give a greyiſh-white ſtreak; the latter a yellowiſh-brown. It is ſemi-hard, inclining ſometimes to ſoft. Rather brittle. Eaſily frangible, and moderately heavy. Sp. gr. 3.300 to 3.810.

It blackens before the blow-pipe, and enters into ebullition with borax, to which it communicates a dirty yellow colour. It always effervesces more or leſs with acids. According to Bergmann, it is compoſed of

Oxyd of iron	38
Oxyd of manganeſe	24
Lime	19
Carbonic acid	10
Water	9
	100

but it is liable to great variation in the proportion of its ingredients. In a recent examination by Collet-Deſcotils, the following reſult was afforded :

Fragments of quartz	2.58
Red oxyd of iron	48.45
Brown oxyd of manganeſe	1.80
Lime	.52
Magneſia	1.98
Carbonic acid, water, and loſs	44.67
	100.

Annales de Chimie, t. 58.

The ſpecific gravity of the ſpecimen analyſed in this caſe was 3.693 ; and its colour was browniſh-yellow.

It occurs in primitive and ſecondary mountains; in the former, in veins; in the latter, in beds.

It is found ſparingly in Britain ; and not very abundantly in Sweden, Norway, Switzerland, Siberia, Bohemia, and Saxony. At Schmalkalden, in Heſſia, however, there is a bed from 25 to 30 fathoms thick ; and in different parts of Weſtphalia, Stiria, Carinthia, &c. it is very plentiful. A whole hill, in the province of Biſcay, is compoſed of it, which is ſaid to have been worked for ſeveral thouſand years.

It is much uſed as an ore of iron, and the metal produced from it is conſidered to be peculiarly favourable for ſteel-making ; but whether this is any thing more than a mere prejudice, ſeems greatly to be queſtioned.

Sp. 9. *Black iron-ſtone. Schwarz eiſenſtein. La mine de fer noire. Ferrum ochraceum nigrum.*

This is divided into two ſub-ſpecies ; compact black iron-ſtone, and black hematite.

Subſp. 1. *Compact Black Iron-ſtone*.—Colour between blueiſh-black, and dark ſteel-grey. Occurs maſſive, and in various imitative forms. Surface dull, or faintly glimmering. Internally it is bordering on gliſtening, and its luſtre ſemi-metallic. Fracture commonly conchoidal, ſometimes uneven. Fragments indeterminate, ſharp-edged. Streak ſhining, but unchanged. It is ſemi-hard, brittle, eaſily frangible, and heavy. Sp. gr. 4.076, according to Wiedemann.

This mineral had for a long time been claſſed as an ore of manganeſe, and was removed to the preſent genus from ſome particular diſtinctions that were pointed out by Werner, between the compact grey manganeſe ore, of which it had uſually been conſidered a variety, and the ſub-ſpecies now under examination. M. D'Aubuiſſon, however, in the courſe of his late reſearches, has ſubjected a ſpecimen of it to chemical analyſis ; and inſtead of finding iron to be its principal ingredient, has aſcertained it to be almoſt wholly compoſed of manganeſe and ſilex. This would, perhaps, be a ſufficient authority for transferring it to the latter genus again ; but as the Wernerian claſſification has been uniformly adhered to in the preſent article, it has been deemed beſt to continue its enumeration here, and accompany the account of it with the particulars of M. D'Aubuiſſon's inquiry.

The ſpecimen he examined came from Raſchau, in Saxony, and was of a blueiſh-black colour mixed with grey. It had a compact fracture, was ſemi-hard, approaching to hard, and of the ſpecific gravity of 3.6. It conſiſted of

Peroxyd of manganeſe	64
Silex	13
Volatile matter	14
Loſs (occaſioned by an accident in drying ſome carbonat of manganeſe on the filter)	9
	100

Annales de Chimie, t. 75.

Conſiderable difference is very likely to exiſt in the chemical conſtitution of this mineral, and the total abſence of iron, in the preſent caſe, may certainly be regarded as rather an extraordinary circumſtance. Indeed, Werner's judgment is much too accurate to admit the ſuppoſition, that the varieties which have come under his inſpection were deſtitute of it ; but from the very great produce of manganeſe in the above analyſis, and the general character of the ſpecies, in imparting a violet-blue colour to borax, there can be little doubt that this, if not both ſub-ſpecies of black iron-ſtone, are, properly, ores of the former metal.

Subſp. 2. *Black Hematite*.—Colour inclining more to ſteel-grey than the preceding ſub-ſpecies. Occurs maſſive and reniform. Internally it is glimmering ; luſtre ſemi-metallic. Fracture delicately fibrous, paſſing into even. Fragments wedge-ſhaped. Occurs in granular diſtinct concretions. In other reſpects agrees with the preceding.

Before the blow-pipe, both the members of this ſpecies melt with borax into a violet-blue coloured glaſs. No exact analyſis has yet been made of the black hematite ; but its chemical conſtitution is in all probability very much ſimilar to that of the former ſub-ſpecies.

Black iron-ſtone is found in primitive and fletz mountains, accompanied with brown and ſparry iron-ſtone and quartz.

It occurs at Naila, in Bareuth ; Raſchau, in Saxony ; Heſſia, the Upper Palatinate, and the Hartz.

Sp. 10. *Clay iron-ſtone. Thoneiſenſtein. Le fer argileux. Ferrum ochraceum argillaceum.*

This widely diſtributed, and highly valuable mineral, is divided into ſeven ſub-ſpecies ; reddle, columnar clay iron-ſtone, lenticular clay iron-ſtone, jaſpery clay iron-ſtone, common clay iron-ſtone, iron kidney, or kidney-ſhaped iron-ore, and pea ore, or pea-ſhaped iron-ore.

Subſp. 1. *Reddle*.—Colour light browniſh-red. Occurs only maſſive. Principal fracture ſlaty, glimmering. Croſs fracture earthy, dull. Fragments tabular, ſplintery or indeterminate. Streak lighter than the fracture ſurface, and more ſhining. Soils ſtrongly, and may be written with. It is ſoft, and very ſoft, ſectile, eaſily frangible ; ſtrongly adherent to the tongue, meagre to the touch, and moderately heavy. Sp. gr. 3.1391 to 3.931.

It decrepitates and blackens at a red heat, and, in a more elevated temperature, melts into a kind of pumice of a greeniſh-grey colour.

It moſt generally occurs in the newer clay ſlate ; and is found in Thuringia, Saxony, Sileſia, Salzburg, Heſſia, and Siberia.

It is ſcarcely uſed for any other purpoſe than drawing.

Subſp. 2. *Columnar Clay Iron-ſtone*.—Colour browniſh-red, paſſing ſometimes to cherry-red. Occurs maſſive, and in pieces which are more or leſs angular. Surface rough and dull. Internally dull, and fracture earthy. It moſt uſually occurs in columnar diſtinct concretions. Streak blood-red. It is ſoft, very eaſily frangible, brittle, meagre to the touch, adheres ſlightly to the tongue, and is moderately heavy.

It blackens before the blow-pipe, and imparts an olive-green colour to borax.

It is but rarely met with, and appears to be, in ſome inſtances, of pſeudo-volcanic origin. Its occurrence with porcelain jaſper, and other minerals which are evidently of that claſs, gives conſiderable colour to the idea; but there are caſes, as the one obſerved by Reuſs in Bohemia, where it appeared in the centre of a mountain of clay-ſlate, that are equally oppoſite in their evidence.

It is found in the iſle of Arran, at Sobruſan, Hoſchnitz, Delau, and near Prohn, in Bohemia; at Dutweiler, in Saarbrücken; and Amberg, in the Upper Palatinate.

It yields too ſmall a proportion of metal, even where the mineral is ſufficiently abundant, to be at all worked as an ore of iron.

Subſp. 3. *Lenticular Clay Iron-ſtone.*—Colour browniſh-red, varying to reddiſh and yellowiſh-brown, and greyiſh-black. Occurs maſſive. Internally it is ſtrongly glimmering, ſometimes gliſtening, and always ſemi-metallic. Fracture fine earthy, and ſometimes ſlaty. Fragments indeterminate, blunt-edged. Occurs in diſtinct concretions, which are frequently lenticular, but ſometimes granular. The ſtreak varies with the colour of the ſpecimen: generally lighter. It is uſually ſoft, ſometimes very ſoft, and ſemi-hard. Sectile, inclining to brittle; very eaſily frangible, and heavy.

Its compoſition, according to Lampadius, is

Of oxyd of iron	64.
Alumine -	23.
Silex - -	7.5
Water - -	5.
Loſs	.5
	100

The black varieties, which occur only in the canton of Berne, are ſaid to yield 90 *per cent.* of iron. The red ore, which is found very abundantly in Bohemia, affords 60 *per cent.*

It is diſtributed in tranſition and fletz mountains, and generally unmixed with other minerals.

Beſides the ſituations already noticed, it is met with in Suabia, the Netherlands, Bavaria, Franconia, and France.

It is ſmelted as an ore of iron, and the brown varieties of it, which contain from 30 to 35 *per cent.* of metal, are much valued on account of the excellent quality of the metal that is produced from them.

Subſp. 4. *Jaſpery Clay Iron-ſtone.*—Colour browniſh-red. Occurs maſſive. Internal luſtre dull, bordering on glimmering. Fracture flat conchoidal; ſometimes even. Fragments rhomboidal, alſo cubic and trapezoidal. Lighter in the ſtreak. Soft, brittle, eaſily frangible, and heavy.

It has, hitherto, been only met with in a bed which belongs to the ſecondary or fletz formation, between Vienna and Hungary.

Subſp. 5. *Common Clay Iron-ſtone.*—Colour light yellowiſh-grey, inclining to aſh-grey, and paſſing into blueiſh and ſteel-grey, yellowiſh, reddiſh, and clove-brown, brick-red, and browniſh-red. Theſe colours, particularly the lighter ones, undergo a change on expoſure to the air, generally becoming darker. Occurs maſſive, and in a variety of extraneous forms, eſpecially of ſhells and vegetables. Internally it is dull. Fracture earthy, ſometimes conchoidal and ſlaty. Fragments indeterminate, blunt-edged; ſoft; rather brittle; adheres a little to the tongue; is more or leſs eaſily frangible; meagre to the touch, and heavy. Sp. gr. from 2.936 to 3.471.

Expoſed alone before the blow-pipe it blackens, but does not melt. With borax it enters into a ſort of ebullition, and produces a glaſs of a blackiſh olive-green colour. It varies conſiderably in the proportion of its ingredients. Some ſpecimens of the mineral yield as much as 40 *per cent.* of oxyd of iron, whilſt others do not afford more than 20 *per cent.*, and many even leſs than that. The following, which will contribute to ſhew this, are the reſults of ſome analyſes by Richter and Lampadius.

Oxyd of iron	20.1	33.9	39.	42.5
Oxyd of mangan*é*ſe	1.	1.1		3.
Silex - -	19.9	23.9	5.	13.8
Alumine -	30.2	13.	40.	13.6
Magneſia -			6.	
Carbonic acid -	28.8	28.1		27.1
Water -			9.	
Sulphur -			1.	
	100	100	100	100

This ſubſpecies is a very abundant one, and occurs in beds in the ſecondary or fletz formation.

It is found very plentifully in different parts of England and Scotland; and is alſo met with in Weſtphalia, Bohemia, Sileſia, the Upper Palatinate, Poland, Ruſſia, Siberia, Italy, and Norway.

Subſp. 6. *Reniform iron ore.*—Colour yellowiſh-brown, varying in intenſity in the ſame ſpecimen. The centre is the lighteſt, and not unfrequently includes a ſmall kernel of an ochre-yellow tint. Occurs in maſſes from the ſize of a walnut to that of a man's head, which are moſt commonly imbedded in clay or ſhale. Fractured towards the ſurface, even; in the interior fine earthy. Fragments indeterminate, rather ſharp-edged. Internal luſtre dull; externally glimmering, ſemi-metallic. It is compoſed of concentric, lamellar, diſtinct concretions, incloſing a nodule, which is often looſe. Surface rough; external layers ſoft; thoſe of the centre very ſoft; brittle; eaſily frangible; adheres to the tongue; is meagre to the touch, and moderately heavy. Sp. gr. 2.574.

It does not melt before the blow-pipe, when heated alone; but enters into fuſion with borax, and communicates to it a dirty yellow colour.

Occurs in the neweſt fletz rocks, imbedded in the argillaceous ſtrata that are incumbent on coal.

It is found abundantly in Derbyſhire, and ſome of the neighbouring counties; in Scotland, Norway, Denmark, Bohemia, Sileſia, Tranſylvania, France, and Siberia.

The greateſt proportion of the iron manufactured in the midland diſtricts of England, as well as in many parts of Scotland, is obtained from the two foregoing ſubſpecies. The metal which they afford, too, is, generally ſpeaking, of the beſt quality. This is principally referable to the liberal ſupply of earthy matter in their compoſition; for, without a ſufficient production of ſcoria, or cinder, in the blaſt-furnace, the highly carbonized, and conſequently moſt valuable, varieties of iron cannot be formed. Theſe ſubjects will be more fully diſcuſſed in a ſucceeding ſection of the article.

Subſp. 7. *Piſiform iron-ſtone.*—Colour yellowiſh-brown, of different ſhades, paſſing ſometimes to blackiſh-brown. This is its internal appearance. Externally, it varies according to the nature of the ſtratum in which it is imbedded, being reddiſh, yellowiſh, and liver-brown, and even yellowiſh-grey. Occurs in ſmall ſpherical grains. Centre of the grain dull; luſtre increaſing towards the ſurface to gliſtening. Internal fracture fine earthy; externally, even. Fragments indeterminate, ſomewhat ſharp-edged. Occurs in concentric, lamellar, diſtinct concretions. Streak yellowiſh-brown. It is ſemi-hard, paſſing to ſoft. Not very brittle; eaſily frangible. Sp. gr. 5.207.

It exhibits, before the blow-pipe, the ſame appearances as the laſt ſubſpecies. Subjoined are the reſults of two analyſes of it; the former by Vauquelin, the latter by Mallinghof:

Iron	30	45
Oxygen	18	15
Alumine	31	13
Silex	15	12
Water	6	15
	100	100

This mineral is ſuppoſed by Werner to occur in the ſecond fletz lime-ſtone, and in clay-beds.

It is found in France, Switzerland, Franconia, Heſſia, Suabia, the duchy of Wirtemberg, and Dalmatia. In the latter country, it is ſaid to be uſed by the inhabitants inſtead of ſhot.

The greater part of the French iron is extracted from this ſubſpecies. It yields, in the large way, from 30 to 40 *per cent.* of metal.

Sp. 11. *Bog iron ore. Raſeneiſenſtein. Le fer limoneux. Ferrum ochraceum cæſpititium.*

Werner divides this into three ſubſpecies; moraſs ore, ſwamp ore, and meadow ore.

Subſp. 1. *Moraſs ore.*—Colour yellowiſh-brown. It is ſometimes friable, and ſometimes approaching to coherent. When the latter, it occurs maſſive, corroded, and in grains. The former varieties conſiſt of duſty particles. Luſtre dull. Fracture earthy. Fragments indeterminate, blunt-edged. Soils conſiderably. Is meagre to the touch, and light.

Subſp. 2. *Swamp ore.*—Colour dark yellowiſh-brown, ſometimes paſſing to yellowiſh-grey. Occurs corroded, veſicular, and amorphous. Luſtre dull, ſometimes ſlightly glimmering. Fracture earthy, paſſing to fine-grained, uneven. Fragments indeterminate, blunt-edged. Streak light yellowiſh-brown. Very ſoft; ſectile. Eaſily frangible, and moderately heavy. Sp. gr. 2.944.

Subſp. 3. *Meadow ore.*—Colour, when freſh broken, blackiſh-brown, paſſing ſometimes to yellowiſh-brown, and browniſh-black. Occurs maſſive, in grains, tuberoſe, perforated, and amorphous. Externally it is rough and dull. In the interior it varies from ſhining to glimmering; luſtre reſinous. Fracture conchoidal, paſſing ſometimes to ſmall-grained, uneven, and earthy. The conchoidal varieties have the brighteſt luſtre. Fragments indeterminate, blunt-edged. Streak light yellowiſh-brown. Soft; brittle. Very eaſily frangible, and heavy.

Bog-iron ore in general blackens before the blow-pipe, without melting. It enters into ebullition with borax, and produces a glaſs of a dirtyiſh yellow colour. The only member of the ſpecies that appears to have been ſubjected to analyſis is the meadow ore: and it is conſtituted, according to the information of M. D'Aubuiſſon, of

Peroxyd of iron	61
Peroxyd of manganeſe	7
Silex	6
Alumine	2
Volatile matter	19
Phoſphoric acid	2.5
Lime, ſulphur, and loſs	2.5
	100

Annales de Chimie, t. 75.

The volatile matter, which ſo conſtantly forms a part of the reſults quoted from this chemiſt, almoſt excluſively conſiſts of water; and it was with a view, indeed, of aſcertaining the proportion of this ingredient, that his analytical labours were principally commenced. He ſuppoſes it to be an eſſential conſtituent of the different minerals he has examined, and propoſes to arrange them under the claſs of *hydrats*.

The preſent ſpecies is ſmelted in ſome of the countries that afford it, and yields, in the large way, from 30 to 35 *per cent.* of metal.

It occurs in the neweſt formations, and is conceived to be continually depoſited in marſhy places, from the evaporation of the water that has held it in ſolution. The preceding ſubſpecies are products of this proceſs at different ſtages; and the order in which they are arranged is indicative of the date of their formation.

It is found in different parts of the Highlands of Scotland, the Hebrides, Orknies, and the Shetland iſlands. Poland and Pruſſia contain conſiderable quantities of it; as alſo do Brandenburg, Courland, Livonia, and Lithuania. Its occurrence is more frequent in the northern than in the ſouthern countries of Europe.

Sp. 12. *Blue iron earth. Blaue eiſenerde. Le fer terreux bleu. Ferrum ochraceum cæruleum.*

Before it has been expoſed to the air, its colour is greyiſh-white, but afterwards becomes indigo-blue of different ſhades, and ſometimes ſmalt-blue. Occurs maſſive, and diſſeminated; and is compoſed of dull, duſty particles, which are friable and cohering. Soils ſlightly. Feels meagre, and is moderately heavy.

Before the blow-pipe, it becomes of a reddiſh-brown, and afterwards melts into a brilliant black globule, which tinges borax of a deep yellow. It is readily ſoluble in acids. Bergmann had ſuppoſed it to be a native *Pruſſian-blue;* and it has received a place in many mineralogical ſyſtems, under that name, from the ſame belief: but an analytical examination of it by Klaproth ſeems to prove it to be a compound of phoſphat of iron and alumine.

It occurs in neſts in clay-beds, amongſt bog-iron ore, and incruſting turf and peat.

It is found, under the latter circumſtances, in the Shetland iſlands; it alſo appears in Iceland, Saxony, Sileſia, Swabia, Bavaria, Poland, Siberia, Ruſſia, and Sweden.

Sp. 13. *Pitchy iron ore. Eiſenpecherez. Fer phoſphaté.*

Colour pitch-black, paſſing ſometimes into blackiſh-brown, and even deep reddiſh-brown. Occurs maſſive. Surface earthy, and dull. Internally it is gliſtening; luſtre reſinous. Fracture foliated, conchoidal, and ſometimes fine-grained, uneven. Fragments indeterminate, tolerably ſharp-edged. Opaque; ſemi-hard; brittle. Not very eaſily frangible, and moderately heavy. Sp. gr. 3.956.

It melts eaſily before the blow-pipe, and forms a black enamel. According to Vauquelin, it conſiſts of

Phoſphoric acid	27
Oxyd of iron	31
Oxyd of manganeſe	42
	100

Is found near Limoges, in France.

Sp. 14. *Green iron earth. Grüne eiſenerde. Le fer terreux vert. Ferrum ochraceum viride.*

This is divided into two ſubſpecies; friable green iron earth, and coherent green iron earth.

Subſp. 1. *Friable green iron earth.*—Colour ſiſkin-green. Occurs maſſive, and diſſeminated; and conſiſts of particles which are without luſtre. Fragments indeterminate; ſoils; is ſoft, and very ſoft. Sometimes friable. Meagre to the touch. Eaſily frangible, and moderately heavy.

Subſp. 2. *Coherent green iron earth.*—Colour rather darker than the laſt ſubſpecies. Occurs maſſive, and corroded. Internally dull. Fracture fine earthy, paſſing into even, and ſometimes into ſplintery. Fragments indeterminate; ſoft. Rather brittle, and inclining to heavy.

Before the blow-pipe, it becomes firſt red, and then of a dark brown; but does not melt. It tinges borax of a yellow colour, inclining to olive-green. No exact analyſis has been made of this ſpecies; but it is ſuppoſed by Werner to have iron and phoſphoric acid for its principal ingredients.

It is a rare mineral, and has hitherto been only found at Braunſdorf and Schneiberg, in Saxony, where it occurs in veins: in the former place, accompanied with quartz and pyrites; and in the latter, with quartz and native biſmuth.

Sp. 15. *Cube-ore. Wurfelerz. Fer arſeniate.*

Colour olive-green, of different degrees of intenſity. Occurs maſſive, diſſeminated, and cryſtallized in ſmall and very ſmall cubes, which are ſometimes flattened and truncated at the angles. Planes of the cryſtals ſmooth and ſplendent. Internally it is gliſtening, and its luſtre between pearly and adamantine. Fracture imperfect foliated. Fragments indeterminate. Occurs in granular diſtinct concretions. It is tranſlucent; ſoft; brittle, and gives a ſtreak of a ſtraw-yellow colour. Sp. gr. 3.000. It appears ſometimes in the form of a reddiſh-yellow powder, which is thinly diſtributed over the ſurface.

Before the blow-pipe it ſwells up, and emits an arſenical odour; melting afterwards into a grey metallic globule, ſlightly tinged with yellow. From the analyſis of Chenevix, it appears to be compoſed of

Arſenic acid - -	31.
Oxyd of iron -	45.5
Oxyd of copper -	9.
Silex - - -	4.
Water of cryſtallization	10.5
	100

It occurs in veins, accompanied with ſome ores of copper, quartz, mica, and feldſpar.

The only places that have, hitherto, afforded it, are the mines of Carrarach and Muttrell, in Cornwall.

Until the account publiſhed of this mineral by the count de Bournon, and Mr. Chenevix, in the Philoſophical Tranſactions for 1801, it was miſtaken for an arſeniat of copper.

§ 2. *Aſſay and Analyſis.*

Since the metal contained in every ore is of ſo much greater ſpecific gravity than any other of its accompanying ingredients, it will be eaſy to form a tolerable idea of the value of an iron-ore by the weight of a given bulk.

Previouſly to working any iron-ore it ſhould be very minutely analyſed, both in the humid and dry way. By the humid proceſs we ſhall aſcertain the exact proportions of its conſtituents, without which it would be a mere work of chance to attempt to extract the iron in the metallic form.

When we are acquainted with the nature of the earthy matter in combination with the ore, we know with the greateſt certainty what ſubſtances we ought to add in the crucible, for the purpoſe of eliminating the metal. All ſuch ſubſtances are called fluxes, merely becauſe they form fuſible compounds with the earthy matter of the mineral. It is to this treatment of a ſmall quantity of the ore that we give the name of aſſaying.

The proceſs by which the component parts are aſcertained, conſiſts in ſubjecting a ſmall quantity of the ore in fine powder to the action of an acid, and ſometimes to an alkali. By this means the whole is diſſolved, and the different materials of which it is compoſed are ſeparately precipitated by different chemical re-agents. The proceſs, however, varies conſiderably with the nature of the ore to be examined.

Iron ores, as ſubjects of analyſis, are divided into three heads; namely, ſulphurets, oxyds, and ſalts.

The firſt are diſtinguiſhed by their general bronze colour, but more particularly by the ſuffocating ſmell of ſulphureous acid gas, which they afford by being heated to redneſs in the open air. The ſecond conſiſt of iron united with oxygen, and are by far the moſt common of all. Nearly the whole of the iron-ores in uſe are of this kind, containing alſo different proportions of earthy matter in their compoſition.

The third diviſion comprehends ſuch as conſiſt of the oxyd of iron combined with ſome acid, and hence are called ſalts. The principal varieties of theſe are the phoſphats, ſulphats, arſeniats, and carbonats.

The apparatus employed in the humid analyſis will be a lamp fitted up with different-ſized ſliding-bearers, a ſilver crucible, and ſmall portable furnace, with a ſand-bath, and one of water, for drying precipitates; capſules of glaſs and porcelain; precipitating glaſſes, funnels, and filtering paper. For reducing the ore to powder, a mortar of hardened ſteel will be firſt neceſſary, and afterwards one of agate, to grind it very fine. Accurate weights and ſcales will be highly requiſite, with cups of ſilver or platina.

The re-agents wanted will be ſulphuric, muriatic, and nitric acids. Pure potaſh, ſoda, and borax, in the ſolid form. Solutions of the ſame, and alſo the pure aqua ammonia. The fully ſaturated carbonats of all the alkalis, and the ſubcarbonats of the ſame. The triple pruſſiat of potaſh and iron; and, when merely uſed as a teſt, pruſſiat of lime will anſwer. The analyſt ſhould, alſo, have in his poſſeſſion powders or ſolutions of all the ſeparate ſubſtances of which the mineral is ſuppoſed to conſiſt, for the purpoſe of comparing real reſults with thoſe obtained in his experiments.

If the ore to be analyſed be a pure ſulphuret, 100 grains, or any other given weight, may be reduced to powder, obſerving to weigh it after the operation, to ſee if any of the mortar has been abraded, which, when the ore is very hard, is to be expected; and the increaſed weight muſt in that caſe be noted down.

Let this powder be boiled with nitric acid in a long narrow-beaked glaſs veſſel, which ſhould be very thin at the bottom, to avoid cracking. By this method the ſulphur of the ore will be converted into ſulphuric acid; part of the nitric acid will be decompoſed, and moſt of the remainder fly off, ſo that the reſulting fluid will principally conſiſt of the iron diſſolved in ſulphuric acid.

To this ſolution add the muriat of barytes, till a precipitation ceaſes to take place. When the precipitate has ſubſided, and the fluid is become perfectly clear, gently pour off the liquor, which is a ſolution now of iron in the muriatic acid. Let the precipitate, conſiſting of ſulphat of barytes, be repeatedly waſhed with hot diſtilled water, till the liquid gives no precipitate with nitrat of ſilver, and afterwards add the waſhings to the fluid firſt poured off. After this white powder has been dried on the ſteam-bath, which is an apparatus conſtructed for this particular uſe, let it be weighed, and for every 100 grains of the ſubſtance allow 21.3 of ſulphur. To the liquid parts which contain the oxyd of iron, add a clear ſolution of the ſub-carbonat of potaſh. Let it boil for a little time, and the oxyd of iron will ſubſide. Waſh it and dry it as above, afterwards weighing the product. The quantity of oxygen in the oxyd of iron thus obtained, may be known by the quantity of iron obtained from it in the proceſs of aſſaying, which we ſhall afterwards give. If the ore conſiſt of oxygen and iron only, it may, without any previous treatment, be referred to the dry proceſs. When, however, earthy matter is combined with it, the humid analyſis ſhould be reſorted to, which requires a different mode of proceeding to that already given.

Let 100 grains of the ore be reduced to a fine powder, as above directed, obſerving to weigh it afterwards, for the purpoſe of aſcertaining whether any of the materials of the mortar be mixed with it. The matter ſo added, if it be acquired from the agate mortar, may be deemed pure ſilex.

To this powder add 300 grains of dry potaſh, in a ſilver crucible, capable of holding about ſix or ſeven ounces. Pour to the mixture a very little water, juſt ſufficient to moiſten the whole. Apply a gentle heat in the firſt inſtance, to prevent the maſs from ſwelling too much, and gradually increaſe the temperature till the crucible is red-hot. The maſs will now be in a ſtate of fuſion more or leſs perfect, according to the quantity of ſilex contained in the ore. If, from a great proportion of alumine being preſent, the fuſion ſhould be very imperfect, more potaſh muſt be added, and the heat continued and raiſed as high as the crucible will bear. When the crucible, with its contents, are ſufficiently cooled, let both together be put into a capſule of porcelain, and nearly filled with diſtilled water. The whole ſhould then be ſet upon a ſand-bath, and boiled for ſome time, taking care to ſtir it very frequently. This will detach the matter adhering to the crucible, and if any ſilex remain unacted upon, it will be diſſolved by the potaſh.

Let the whole be now ſaturated with muriatic acid, and even added a little in exceſs; and then gently boiled till all the liquid is evaporated. During this, the mixture muſt be conſtantly ſtirred; and particularly at the time the maſs is becoming dry.

To this reſiduum let a large quantity of diſtilled water be poured. All the ſubſtances ſoluble in the acid will be now taken up. If it contain ſilex that will be left at the bottom. Let the whole be decanted into a narrow tall glaſs veſſel, to ſuffer the ſilex to ſubſide. Carefully pour off the clear liquor, and then add freſh hot diſtilled water, and continue to do ſo till the fluid does not cauſe a precipitate with nitrat of ſilver; obſerving to ſave all the waſhings which are acted upon by that teſt. The remaining water may now be evaporated from the ſilex, and the powder, being heated red-hot in a crucible of ſilver or platina, ſhould be then weighed. If it be pure, it will be of a delicate white colour, not adhering to the fingers, as is the caſe with ſome of the other earths.

The ſolution containing the remaining ſubſtances ſhould be evaporated to as ſmall a quantity as poſſible, ſo that the fluid remain liquid and clear. To this let a ſaturated ſolution of the ſubcarbonat of potaſh be added, and afterwards boiled a few minutes. By this means, the whole of the ingredients will be precipitated together, and when all of them have perfectly ſubſided, decant off the liquor, repeatedly waſhing it with hot water. The firſt decanted liquor, with the waſhings, may be thrown away. Laſtly, evaporate the remaining water, till the ſolid matter is of a pulpy conſiſtence. To this, in a capſule of good porcelain, add a ſolution of pure potaſh. The alumine will be thus diſſolved, while all the other ſubſtances will remain untouched. Let this fluid be poured off, and freſh water mingled with it, to take away all the alumine. Then, to the mixture containing the alumine, add not only as much acid as will ſaturate the potaſh, but alſo a quantity ſufficient to diſſolve the alumine, when the liquid will be quite clear. Finally, to this pour in carbonat of ammonia, till no more precipitate falls down. The precipitate, when waſhed and dried as above directed, and heated to redneſs in a ſilver crucible, may be conſidered as pure alumine.

The reſiduum from which the alumine was laſt taken is now to be diſſolved in ſulphuric acid, diluted with a large quantity of water, the acid being ſlightly in exceſs. This ſolution may contain magneſia, iron, and probably manganeſe. If lime were preſent, it will be left inſoluble at the bottom of the veſſel, in the ſtate of ſulphat of lime. The ſmall portion of this ſubſtance diſſolved by the fluid, may be precipitated by the addition of alcohol. The powder, when collected and dried at a dull red heat, muſt be weighed; allowing for every 100 parts 42 of pure lime. The ſolution from which the lime was ſeparated, muſt next be ſaturated with a ſolution of the neutral carbonat of potaſh. In a few minutes the iron will be precipitated in the ſtate of oxyd, while the magneſia and manganeſe will be diſſolved by the carbonic acid. The iron muſt be ſeparated, dried, and weighed. If with the ſolution containing the magneſia and manganeſe a ſolution of hydroſulphuret of potaſh be mingled, the latter will be precipitated in the form of a ſulphuret; and this being waſhed and heated till the ſulphur is driven off, the oxyd of manganeſe will be left in ſufficient purity.

The magneſia ſtill held in ſolution may be precipitated by adding a ſufficient quantity of pure potaſh. The product muſt be heated to redneſs, and weighed. The weights of the different ſubſtances being added together, will, if great care has been uſed, be within one or two *per cent.* of the quantity originally ſubmitted to experiment. If the deficiency be conſiderable, ſome miſtake muſt have been made, and it will be neceſſary to repeat the analyſis.

In the examination of ſalts of iron, nothing more is requiſite than to diſengage the acid with which the iron is combined. The arſeniat of iron, for example, muſt be boiled with potaſh, which will ſeparate the arſenic acid, and leave the oxyd of iron but very little acted upon. The arſenic acid may be afterwards precipitated by nitrat of lead; allowing for every 100 parts of the arſeniat of lead, when dried, 33 parts of arſenic acid.

If the ore be a pure carbonat, to 100 grains in powder, add an equal quantity of ſulphuric acid, in a glaſs veſſel which can be placed over a lamp. Heat the mixture for ſome time, ſtirring it with a glaſs rod. The carbonic acid will be thus expelled, and its quantity will be indicated by the loſs of weight ſuſtained. Care ſhould, of courſe, be taken that the heat be not too great, otherwiſe the evaporation of fluid matter may create error in the experiment. The iron may be afterwards treated as in the analyſis of the earthy ores, and its quantity aſcertained, by the methods there deſcribed. Having learned the exact proportions of the ingredients united in the ore, we may, with ſome degree of certainty, proceed to the aſſay by the crucible and fluxes. If the ore conſiſt of oxyd of iron ſimply, nothing more is neceſſary than to introduce it into a crucible with about half its weight of charcoal powder, and any ſubſtance ſuſceptible of vitrification, ſo as to keep off the air. This may be either pounded glaſs, or equal parts of lime and clay. But perhaps the beſt ſubſtance that can be employed, is the moſt fuſible part of the blaſt furnace cinder, which is the leaſt coloured with oxyd of iron. This may be employed in quantity amounting to about half the weight of the mineral to be aſſayed.

The earthy iron ore muſt be treated according to the reſult of the humid analyſis; ſuch earth being added as a flux, as will make the moſt fuſible compound with that found by analyſis to be preſent. The carbonaceous matter may be from $\frac{1}{3}$ to $\frac{1}{2}$ the weight of oxyd of iron.

The furnace beſt calculated for theſe experiments is called an aſſay furnace, and is capable of producing a great heat. See FURNACE.

The crucibles ſhould be very ſmall, not capable of holding more than three fluid ounces; and they ſhould be provided with covers turned to them in a lathe before they are burned. The aſſay may be deemed finiſhed when the whole is in a ſtate of fuſion, and the metallic button ſeparated, which, being weighed, will give the *per centage* of iron in the ore.

§ 3. *Reduction of Ores, and Manufacture of Pig-iron.*

Although iron in its pure ſtate is almoſt an infuſible ſubſtance, it is capable of aſſuming the liquid form, by being combined with other matter. With ſulphur it forms a fuſible maſs, of which we ſhall treat hereafter, It is alſo rendered fuſible at a temperature ſomething higher than that required to melt copper, by being combined with about $\frac{1}{15}$th of its weight of carbon. It is to this compound in different proportions that the name of pig-iron is given, and it is ſo denominated, becauſe it is caſt into maſſes of a ſemi-cylindrical ſhape, called *pigs*.

The fuſibility of this compound of iron and carbon, enables us to extract the metal from the ore to the greateſt advantage. It is now common, particularly in our own country, to obtain the iron in this form, previous to making it into bar, or malleable iron. Formerly caſt metal was not much in uſe, except for the manufacture of bar-iron and ſteel; while in the preſent day, a much greater proportion of it is conſumed in that ſtate than in any other; and the majority of our furnaces, too, are ſolely employed for this branch of manufacture.

The proceſs by which pig-iron is obtained from the different iron ores is called *ſmelting;* and the furnaces employed for the purpoſe are called *ſmelting*, or *blaſt furnaces*. See BLAST *furnace*, and BLOWING.

The ores of iron require different treatment in the ſmelting proceſs, according to the quantity of heterogeneous matter with which the metal is combined.

In all the ores the iron is in the ſtate of oxyd, and would at leaſt require a ſtrong heat in contact with combuſtible matter for their reduction. In moſt, the oxyd of iron is combined with a conſiderable proportion of earthy matter, and they are then denominated *iron ſtones*. Theſe may be generally divided into two claſſes; the one called argillaceous, from abounding with exceſs of alumine, or clay; and the other calcareous, from lime being their principal earthy conſtituent. The former of theſe iron-ſtones is by far the moſt abundant in this country.

But, beſides the earthy matter and oxygen in this claſs of metallic minerals, many of them contain ſulphur, which is doubtleſs combined with the iron in the ſtate of pyrites. Arſenic and mangancſe are alſo ſometimes united with them. Of the above, the arſenic and ſulphur are extricated, previouſly to ſmelting, by the proceſs called *roaſting*. For this purpoſe, the ſtone is ſtratified with refuſe pit coal, and burnt in large heaps in the open air. The heat is ſufficient to diſſipate the greateſt part of the above volatile materials, leaving behind the earth and oxyd of iron; and alſo the mangancſe, when the ore abounds with that metal.

In the proceſs of ſmelting, two things are abſolutely eſſential to the ſeparation of the iron. Firſt, the metal itſelf muſt be rendered fluid, which will then, by its great ſpecific gravity, deſcend to the loweſt parts of the furnace, and ſome other compound muſt, at the ſame time, be eliminated in a liquid form, ſo as to float upon its ſurface, and defend it from the influence of the blaſt. If the ore conſiſted of iron and oxygen alone, the carbon of the coke would combine with the oxygen; and an exceſs of carbon would alſo unite with the iron to render it liquid at that temperature; but here would be a deficiency of the fluid vitreous matter neceſſary to the defence of the iron from the oxygen of the blaſt. Hence it will be neceſſary to employ ſome ſubſtance with ſuch iron-ore, which ſhall be capable of forming a liquid ſcoria, or cinder, for the preſervation of the carburetted iron when once obtained. So far as obſervation has dictated, it would ſeem that the cinder cannot be too perfectly fluid. The principles on which the fuſibility of the cinder depends, are not ſimply confined to the materials uſed in the ſmelting of iron, but refer to all compound fuſible matter with which we are acquainted. It may be obſerved, in general, and, indeed, almoſt without exception, that the fuſibility of an alloy of two metals is fuſible at a temperature much leſs than the arithmetical mean between the fuſing points of the metals themſelves. For inſtance, an alloy of lead and tin is more fuſible than either of the metals compoſing it, and a ſimilar mixture of copper and ſilver may be uſed as a ſolder for either ſilver or copper ſeparately. This property is not leſs conſpicuous in the earths. None of them in their *pure* ſtate can be fuſed in our hotteſt furnaces; nor ſcarcely with a ſtream of oxygen gas; although certain proportions of them are, together, fuſible at the heat of a moderate air-furnace. Lime and clay, when ſeparately taken, may be conſidered as incapable of fuſion at any degree of heat, yet produced in furnaces; and ſtill, in certain proportions, they are too fuſible to be made into even bricks or crucibles. It will appear, from theſe facts, that the iron-maſter cannot pay too much attention to the ſubject of the relative fuſibility of the earths in different proportions. Moſt of the iron-ores of this country are argillaceous; that is, conſiſt, beſides oxyd of iron, of a ſmall quantity of ſilex or flint, and a large proportion of clay. Limeſtone has always been employed for ſuch ores, and, by combining with the clay and flint, as well as with a ſmall portion of the oxyd of iron, forms a ſcoria or cinder, eaſily capable of fuſion. Since, however, the proportions of theſe earths in the ore cannot be uniform, the quantity of limeſtone to be added ought to vary according to circumſtances. We may hence infer, that if the fuſibility of the cinder depends upon the particular proportions of the earths preſent, the iron-maker ought to poſſeſs a very perfect knowledge of the relative fuſibility of different combinations of theſe bodies, and being at the ſame time aware of the component parts of the ore to be reduced, he will not be at a loſs what ſhould be added in the furnace, for the purpoſe of producing the moſt fuſible cinder. But it will be proper here to obſerve, that the earths preſent, however accurate may be their proportions, will not of themſelves form a cinder of ſufficient fuſibility, without the united aid of the oxyd of iron. This fact will be very familiar to thoſe who have had experience in the uſe of fire-bricks. Clays which are free from that ingredient do not burn of a red colour; and hence the white appearance of fire-bricks is a tolerable teſt of their goodneſs. But thoſe, on the contrary, which exhibit a redneſs on being fired, are eaſily fuſed, and unfit, conſequently, to be uſed in thoſe ſituations which are expoſed to great heat. The proportions of lime, clay, and oxyd of iron, neceſſary to conſtitute the moſt fuſible compound,

pound, has not, as we have yet heard, been directly aſcertained by experiment. An inquiry, undertaken with this view, would, however, be of great importance to the ironmaſter. It might be effected in two ways; firſt, by mixing different proportions of the materials employed; and, ſecondly, by a direct analyſis of the moſt fuſible part of the blaſt-furnace cinder, and that with which the beſt and moſt carbonated iron has been produced. The cinder which fuſes at the loweſt temperature will be beſt known by its fracture after cooling. It may, in general, be deemed good in proportion to its earthineſs when ſolid, and particularly ſhould the outer cruſt appear glaſſy and tranſparent. A reaſon may be given for this appearance, by reference to ſome facts announced by ſir James Hall and Dr. Hope, in accounting for the opacity of the whin-ſtone. They found that when common flint-glaſs, which is more fuſible than the blaſt-furnace cinder, was allowed to cool ſlowly, the maſs became opaque, and put on a ſtony appearance. They hence concluded, that the whin-ſtone might have been tranſparent, and have poſſeſſed a glaſſy fracture, had it been cooled rapidly. The inference to be drawn from this will be obvious; for the more fuſible the cinder, the longer it is in cooling, and conſequently the more opaque. What ſtrengthens this idea, too, is, that the exterior of a maſs of cinder is more tranſparent, almoſt conſtantly, than the interior; and the centre of that in particular, under which the beſt iron is made, having a ſtony fracture, with a thin vitreous ſhell ſurrounding its outſide. In beginning to work any new ore of iron, the firſt ſtep is to analyſe it, both in the dry and humid way. By the firſt, we get the *per centage* of iron in the one; and by the ſecond, we become acquainted with the quality and proportions of its earthy matter. The next ſtep is to analyſe the coal to be employed, for the purpoſe of aſcertaining the quantity of carbon it contains, and alſo the nature and proportions of its earthy reſidua. Theſe facts being clearly made out, there will be nothing neceſſary but to add to theſe materials a proper mixture of ſuch ſubſtance as will make the moſt fuſible cinder. If the ore be argillaceous, or, in other words, if clay predominate, lime is to be the material employed. Indeed, ores of this deſcription are ſo very common, that lime has been thought the only ſubſtance to be uſed, under all circumſtances, for the purpoſes of a flux; and ſo completely ignorant have the ironmakers been of the philoſophy of the proceſs, that it has even been attempted to be added when the ore has already abounded with calcareous ingredients.

Keeping in view the principles we have juſt laid down, the management of the calcareous ore will be equally eaſy with the mode of working the argillaceous; ſince, in ſuch caſe, we have only to employ clay for the flux inſtead of lime. But the beſt method would, perhaps, be, if the component parts of an argillaceous and a calcareous ore were ſufficiently well known, to mix the two together in proper proportions.

Whatever may be the ſubſtance employed, whether it be limeſtone for an argillaceous ore, or clay for a calcareous ore, it ſhould be very minutely analyſed, as thoſe ſubſtances are ſcarcely ever found in a ſtate of purity. The lime ſhould, if poſſible, be the ſhell limeſtone. At all events, the magneſian ſtratum ſhould be avoided, ſince that ſubſtance tends much to leſſen the fuſibility of earthy compounds. Some ſubſtances, to which we give the name of clay, frequently conſiſt of a large proportion of ſome other earth.

Another thing to be attended to, alſo, is the ſtate of oxydation in which we find the iron-ore.

If it be highly oxydated, more of the carbonaceous matter will be required for its reduction, and in all probability a longer time; but, beſides this, a greater quantity of the oxyd of iron will combine with the earthy matter, which, although it may contribute to the fuſibility of the cinder, a large portion of the iron will be loſt. On the contrary, when the iron is in a low ſtate of oxydation, the whole of the iron may be apt to combine with the carbon, and the earthy matter may not get a ſufficient quantity of the oxyd to render it, in a proper degree, fuſible. In ſuch caſe, it would be neceſſary to add ſome oxyd of iron, which might more eaſily vitrify and enter into the compoſition of the cinder.

The coal employed in the ſmelting of iron, for the purpoſe of being coked, is commonly laid in heaps in the open air, and afterwards ſet on fire. When the combuſtion has gone on to a certain degree, the fire is checked by covering it with duſt and preventing all poſſible acceſs of air. For farther particulars, ſee Coke.

It is eſſential that the coke ſhould be harder than it can generally be made in the open air without conſiderable waſte; and we recommend, therefore, the method employed in making the cokes for melting ſteel. The coal, which is very ſoft, is piled up in ovens of the ſhape of an erect fruſtum of a cone. The air is let in at an aperture near to the bottom, which is contracted in ſize as the combuſtion becomes rapid, and ultimately cloſed. The whole maſs will at this time have acquired ſuch a degree of heat, as not only to drive off all the volatile matter, but to render the coke extremely hard. There is a conſiderable ſaving in this mode of coking, and the coke is not only more compact, but better adapted for the generality of ores of iron.

In ſmelting the argillaceous ore, the proportions of the roaſted ore, and the limeſtone, are governed entirely by the coke employed. The latter is always a fixed quantity, and the ore and limeſtone are varied according to the quality of the iron to be made and the working order of the furnace. In proportion as more or leſs of lime and ore are added to the ſtandard quantity of coke, the furnace is ſaid to carry a greater or leſs burthen.

It would be uſeleſs to give any preciſe proportions of the ore and limeſtone to a given quantity of the fuel, ſince they are found to vary with the nature of the coal in uſe; and, what is not a little remarkable, the proportions will frequently vary in two furnaces working with the ſame coal, and even in the ſame furnace at different times.

The burthen of the furnace will alſo vary with the quality of iron to be made, that is, as it is required to contain more or leſs carbon. In making the dark-grey iron called N° 1, and which contains the greateſt proportion of carbon, the burthen muſt be leſs than that required to make the leſs carburetted iron, commonly called white iron, or *forge-pig*.

To give a general idea of the proportions of the materials, we ſhall preſent in detail, the quantities uſed at a blaſt-furnace, making in general good melting iron, which is of an intermediate quality between N° 1 and the *forge-pig*. The ore is argillaceous, containing about 27 *per cent.* of iron; the coal rather ſoft, but having a good proportion of carbonaceous matter; and the limeſtone good, being of the ſhelly kind before ſpoken of. The furnace is about 45 feet high, and 12½ feet diameter in the wideſt part. It works with a bright *tuyere*, and receives from the blaſt about 2500 cubic feet of air in a minute, through a circular aperture of 2¾ inches in diameter.

The average charges of coke per *ſhift*, as it is termed, or in the ſpace of 12 hours, are 50 (each 2¾ *cwt.*), or nearly ſeven tons. The calcined ore for good melting iron is about the ſame quantity; and for forge-pig, or the leaſt carburetted variety, ſix of coke to ſeven of ore. The limeſtone unburnt, under the ſame circumſtances, is to coke as four to eleven; and, for melting metal, retains a ſimilar ratio. With the above charge per day, that is, for 12 hours, this furnace makes on the average about 40 tons of melting iron per week.

Some furnaces carry ſo little burthen as not to yield more than 13 or 14 tons weekly; whilſt others, particularly in South Wales, produce, with the ſame ſized furnace, as much as 60 and even 70 tons in an equal time. The burthen of theſe furnaces is very great, the ore to the coke being in ſome caſes as 13 to 7; and the quality of the iron is uniformly inferior. Since the cavity in the furnace is conſtantly kept full of the above materials, it may eaſily be conceived that the whole muſt be in many intermediate ſtages, from the fully melted iron to the unchanged ore. At the point where the greateſt heat is produced, which will be a little above the level of the blaſt, every thing capable of fuſion will be aſſuming the liquid form. We cannot, however, for a moment ſuppoſe, that the iron at this point is in a ſtate of oxyd, ſince it would of neceſſity be all vitrified, and enter into the compoſition of the cinder. If the iron, even in its carburetted form, were to remain long at ſo great a temperature, and within the influence of ſo much oxygen, it would firſt loſe all its carbon, and ultimately paſs into the ſtate of vitreous oxyd. As, however, the oxygen of the blaſt riſes in the furnace, it comes in contact with the carbon of the coke, and is very ſoon converted into carbonic acid gas. That point in the furnace, therefore, where the whole of the oxygen has entered into combination with carbon, may be denominated the commencement of cementation, or the point where the oxyd of iron is firſt deprived of oxygen, and ultimately ſaturated or *cemented*, as it is termed, with carbon. From this point to the top of the furnace the proceſs of cementation is going on with different degrees of rapidity, proportionate to the temperature. It is found by experiment, that if a piece of iron-ore, particularly any of the oxyds that contain but little earthy matter, be expoſed in a cloſe veſſel in contact with carbon, it will firſt loſe the whole of its oxygen, and afterwards become ſo ſaturated with carbon, as to be capable of fuſing into the beſt pig-iron. Hence it appears that the reduction of the ore, ſo far as relates to the deoxydation and carbonization of the iron, may take place at a temperature below fuſion, and without the maſs of ore changing its form. The ore expoſed to the carbonaceous matter in the cementing part of the furnace, muſt as completely undergo a ſimilar change as if it were in the cloſeſt veſſel; for the oxygen is excluded by the preſence of carbonic acid gas. When the carbonized, but yet ſolid, iron, in the form of the ore, falls below the cementing point, or perhaps ſhort of that, it begins to fuſe. The earthy matter of the ore, being in contact with lime, begins alſo to aſſume the liquid form; and whilſt the melted metal is expoſed to the oxygen of the blaſt, a ſmall portion of oxyd of iron is produced, which will enter into the compoſition of the cinder, and thus tend to increaſe its fuſibility. The liquid iron now drops into the chamber of the furnace called the *hearth*; and the liquid cinder, being of leſs ſpecific gravity, floats upon its ſurface, completely defending it from the oxygen of the blaſt. Hence we ſee that the column of the blaſt-furnace may be divided into three portions; the upper portion, or cementing part; the middle, or melting part; and the chamber, or hearth, where the metal is preſerved till it is in ſufficient quantity to be run out into pigs. The cementing portion is by far the moſt extenſive, and will vary in its extent with the ſtrength of the blaſt.

Since the combuſtion muſt be in proportion to the quantity of oxygen conſumed in a given time, the heat of the furnace will depend upon the quantity and velocity of the air blown into it to a certain extent. If the blaſt ſhould have too great a velocity, the oxygen would paſs through a greater ſpace in the furnace than is deſirable before it was diſpoſed of, and the cementing portion would be leſſened in conſequence. On the contrary, if the velocity were too little, the heat would be confined to the vicinity of the tuyere, and the cementing, as well as the melting proceſſes, would be retarded for want of heat.

When the blaſt is ſufficient to generate the neceſſary heat for melting the cinder and the metal perfectly, the extent of the cementing portion will depend upon the height of the furnace. This gives us one very ſatisfactory reaſon, why a furnace is required to be higher for the uſe of coke, than when it is heated with charcoal; ſince the carbon of the latter enters into the compoſition of the iron with much more facility than that of the former.

According to experiment, it appears that the facility with which carbon enters into combination with iron, in a cloſe veſſel, is inverſely as its aggregation or coheſion. Hence it is found, that the carbon obtained from animal ſubſtances, which is ſoft and porous, is beſt calculated to convert iron into a carburet.

It will appear from the laſt obſervation, and from what has been ſaid on the nature of coke, that the carbon employed for cementation ſhould be mechanically different from that required to generate the great and permanent heat neceſſary to the fuſion of the materials. The ore in the cementing portion ſhould, therefore, if it were practicable, be ſurrounded with coke of the ſofteſt kind, while the materials within the influence of the blaſt, and occupying the melting portion, ſhould be ſupplied with ſuch as is harder.

In making the moſt highly carbonized iron, or what is called N° 1, it ſometimes happens that a portion of the iron unites with a great exceſs of carbon, forming a ſubſtance, which, when cold, appears in bright ſhining ſcales. It is found to poſſeſs moſt of the properties of plumbago, differing from that ſubſtance only in containing leſs carbon. This carburet is no doubt in the liquid form in the furnace, and, being of much leſs ſpecific gravity than the iron, floats upon its ſurface. It is ſo much more infuſible than the metal, that before the iron enters the moulds of the pig-bed it is ſeen ſwimming at the top in the ſcaly form before mentioned.

This ſubſtance is called by the workmen *kiſh*; and whenever it appears, is a certain ſign that the furnace is working on the beſt ſort of iron. So ſurely, indeed, is it the caſe, that N° 1, or the moſt highly carburetted metal, has received the epithet of *kiſhy*, becauſe *kiſh* is the common attendant on its production.

The moſt remarkable and anomalous circumſtance preſented in the ſmelting of iron, is the difference in quantity and quality of the iron made in winter and in ſummer, when all other things are equal. It is a fact well aſcertained, that in order to make the ſame quantity and quality of iron in ſummer as in winter, the furnace will not carry ſo great a burthen, and, at the ſame time, the means of generating heat requires to be increaſed.

Various opinions have been given to explain this curious fact. Some have ſuppoſed that the proportion of the oxygen was leſs in the atmoſphere in ſummer than in winter. Others, that the exceſs of moiſture contained in the air in ſummer above that in the winter, might explain the phenomenon. Whatever may be the cauſe of this difference in the blaſt-furnace, the ſame may equally be referred to common fires, which, it is well known to every one, are much hotter in winter than in ſummer. If the Lavoiſierian doctrine of combuſtion were true, we ſhould not expect that the power of air to generate heat would vary with the temperature, ſince the ſame caloric which had contributed to dilate the oxygen in ſummer, would be given up when the oxygen combined with the carbon. Unfortunately for that doctrine, however, we find that the quantity of heat generated during the combination of oxygen, is directly as the quantity of oxygen, whatever may be its ſtate, whether ſolid, liquid, or aeriform.

It appears from general obſervation, that the difference in the quantity and quality of the iron made in winter and ſummer may be, in a great meaſure, referred to changes ariſing from variation of temperature. The average reſult of this atmoſpheric influence is different with different blaſt-furnaces, and, indeed, with the materials employed; but in general the quantity varies in winter and ſummer from $\frac{1}{5}$th to $\frac{1}{7}$th, beſides the alteration of quality, which in ſome furnaces cannot be prevented by any change in the burthen.

If the whole of this difference depend upon the temperature of the blaſt ſent into the furnace, we muſt expect to find it either in the increaſed rarity of the air, or in the preſence of moiſture, which exiſts more abundantly in the atmoſphere in ſummer than in winter; or, perhaps, it may be attributable to both theſe circumſtances.

Soon after the conſtituent parts of water were diſcovered, ſome iron-maſters attempted to produce combuſtion by blowing ſteam into the furnace. But, notwithſtanding the great proportion of oxygen exiſting in aqueous vapour, their expectations were far from being realized, and the ſcheme was given up by them under a firm conviction that it never could ſucceed.

This experiment, however, ſerved to ſhew that no more miſchief might be expected from the vapour of water in the atmoſphere, than its merely excluding a portion of oxygen. Conceiving it, therefore, to have no other influence in the furnace, we will ſubmit ſome calculations to the reader, in order to ſhew the abſolute difference in the quantity of oxygen ſent into the furnace in winter and in ſummer, and to aſcertain what ſhare of the defect may be attributed to this circumſtance, or whether the whole may not ſafely be referred to it.

We have much to regret that we are not in poſſeſſion of more experiments as to the temperature of the air ſent into the furnace at different times of the year. The mere temperature of the atmoſphere is not ſufficient for this purpoſe, ſince the air gives out much heat by compreſſion in the blowing cylinder. In a former part of this work (ſee BLAST-*furnace*), a table of ſome obſervations was given, on which, as far as they go, reliance may confidently be placed. In this table the temperature of the air was ſtated when it entered the blowing cylinder, and after it had been compreſſed into a vault, from which it paſſed into the furnace. If we take the temperature on its entrance into the furnace in winter at 50°, and in ſummer at 100°, the difference will be 50°, and the variation in the quantity of oxygen will be inverſely as the increaſed volume of the air. It is found that elaſtic fluids are augmented in bulk by one degree of Fahrenheit .00208 of the whole. Therefore, the quantity of oxygen at 50° will be to that at 100° as $1 + (100 - 50) \times .00208 : 1$; and the oxygen, conſequently, in ſummer will be .104, or little more than $\frac{1}{10}$th leſs than in winter.

The defect ariſing from the relative quantities of moiſture contained in the air in winter and ſummer will be very trifling, except where the water-regulator is employed inſtead of the air vault or common regulator. (See BLAST-*furnace.*) When the air does not come in contact with any thing moiſt after entering the blowing cylinder, in order to learn the quantity of water preſent, we have only to aſcertain the relative proportions of vapour exiſting at the reſpective temperatures of the atmoſphere in winter and ſummer. It appears from a theorem, which we have founded upon Mr. Dalton's ingenious experiments upon evaporation and the force of vapours, that the quantity of water in air at 32°, at which temperature we ſuppoſe it to enter the furnace in winter, is equal to 2.04 grains in each cubic foot. This, in weight, is $\frac{2.04}{561}$; and in bulk, vapour being to air at 32° as 274 to 561, equal to $\frac{2.04}{274}$ of the whole, or .0075. The ſummer air, which we take at 55°, contains 5.32 grains in a cubic foot; a quantity amounting in weight to $\frac{5.32}{524}$, and in bulk to $\frac{5.32}{274}$, or .019 of the whole. The difference .0115 is the deficiency of common air in ſummer, ariſing from the preſence of aqueous vapour; and makes the total variation in the quantity of oxygen between ſummer and winter equal to $.1155 = \frac{23}{200}$, or $\frac{1}{9}$th nearly.

We here conſider water as producing injury merely by diſplacing a certain proportion of oxygen, and not being prejudicial in itſelf, as is ſuppoſed by the generality of iron-maſters. The reaſon given for its bad effects does not appear intitled to much weight. The opinion commonly entertained is, that the carburetted hydrogen ſet at liberty, carries off a greater quantity of heat than the nitrogen of atmoſpheric air. An effect which, if even true, is inadequate to explain the appearances. When the air is received into a water-regulator, as is the caſe in many blaſt-furnace works, a much larger quantity of moiſture may be expected to enter the furnace, than with the ordinary apparatus. In the above calculation, if the air had been received over water, we ſhould find that its temperature in the receiving veſſel in winter and ſummer would be 50° and 100°. The vapour in the former amounts to 4.67 grains in a cubic foot: in the latter, to 18.95 grains in the ſame quantity.

Hence, air at 100° will contain leſs oxygen than that at 50°, by .055 of the whole; which is a little more than $\frac{1}{20}$th. This added to the loſs by increaſed temperature alone, will be .159, or nearly $\frac{1}{6}$th.

We may from this conclude, that the extra-quantity of moiſture admitted by uſing the water-regulator, will at any rate increaſe the difference in the amount of oxygen from $\frac{1}{9}$th to $\frac{1}{6}$th, or thereabouts; which, in all probability, will more than counter-balance the good effects ariſing from its uniform preſſure. There does not appear to be, in the preſent ſtate of our knowledge, any means of effectually remedying this evil. Some good might accrue from admitting the exterior air as cold as poſſible, and not allowing it to come in contact with water after entering the blowing-cylinder. This may be done to a certain degree, by cauſing the air to aſcend from a deep pit, by a pipe communicating with the blowing cylinder. This contrivance, however, ſhould be alaid aſide whenever the air of the atmoſphere becomes colder than the average temperature of the earth.

With regard to the defect ariſing from increaſe of volume of the air in the ſummer months, the heat cauſed by the friction of the blowing piſton will be found to contribute much to the evil. The air by this means gets an additional elaſticity, and if the ſame quantity of air be thrown into the furnace it muſt be effected by decreaſing the preſſure of the blaſt, or by increaſing the aperture of the *noſe-pipe*. If the compreſſion of the air could be effected by any means which would avoid the friction of machinery, it would no doubt be a deſideratum in the proceſs of blowing. It will appear from theſe facts, that in ſummer, when the quantity of air is deficient from increaſe of volume, and from the preſence of water, that a larger quantity of air ſhould be made to enter the furnace, partly by increaſing the velocity, and partly by uſing a *noſe-pipe* of greater diameter. If the deficiency were made up by the increaſe of preſſure only, the velocity would be too great for producing a maximum of combuſtion, where it is immediately wanted, independent of the mechanical evil it would be liable to produce. If, on the other hand, the aperture of the *noſe-pipe* were increaſed in ſummer, to make the quantity equal to that of winter, the air would enter in a ſtate of greater rarity, and the combuſtion would, from this cauſe, be of leſs intenſity. This circumſtance alone, perhaps, is ſufficient to prevent a complete remedy of the evil, and will go far to explain the difference between the fractions reſulting from calculation and experiment.

We ſhall conclude our account of this department of iron-manufacture with ſome general obſervations upon the nature and properties of pig-iron, as it is applied to different purpoſes.

When the iron has combined with its full doſe of carbon, conſtituting what is called in the trade, grey, or ſmooth-faced iron, and alſo N° 1, it is admirably fitted for making the lighter and finer ſort of caſtings, ſuch as grates and other ornamental work. It is from iron of this quality that the caſt-iron cutlery is manufactured, ſince no other would run ſufficiently fluid for articles ſo ſmall as the prongs of forks, and the bows or rings of ſciſſors. This iron, however, is not the beſt for larger caſtings where ſtrength and hardneſs are deſirable; as in large wheels, for example, beams, pillars, railways, &c. The metal employed for theſe purpoſes contains a leſſer proportion of carbon than the former, and is generally called melting-iron, or N° 2.

That ſpecies of pig-iron, however, which is combined with the ſmalleſt doſe of any, is almoſt excluſively employed for making malleable iron, and is called, for that reaſon, *forge-pig*. We have given, in the next ſection, an account of the proportion of carbon preſent in the different varieties; and it will appear from thence, that of all the combinations of iron and carbon, ſteel contains the leaſt, and grey, or N° 1, pig-iron, the moſt of any of the compounds we are yet acquainted with.

As a proof that pig-iron only requires to loſe its carbon to become malleable, we have at preſent in this country manufactures upon a large ſcale, for converting caſt metal goods, ſuch as nails, cutlery, &c. into iron perfectly malleable, without even changing the figure given to them by caſting. Nails produced in this way are ſo malleable, even when cold, as to bear the hammer, and are capable of being bent to a right angle in a *vice*.

But a ſtill ſtronger proof that this metal aſſumed the form of iron is from the great heat it will bear. The prongs of a common fork made by this proceſs can be welded together with the greateſt facility. Pig-iron, until lately, has been conſidered a much more complex body than experience has warranted. We have heard of its being ſuppoſed to contain ſilex, or, according to Mr. Davy, ſilicum, to which it owes ſome of its crude qualities. But the proceſs juſt mentioned is ſufficient to refute the aſſertion. Iron maſters, even at this day, however, will talk about oxygenated pig-iron, meaning that which is leaſt carbonated; but it muſt be clear to every one acquainted with the chemical qualities of thoſe bodies, that the preſence of carbon and oxygen in a liquid maſs is perfectly impoſſible, as they are incapable of exiſting together uncompounded at any ſuch elevated temperature. Hence we muſt regard pig-metal as a compound of iron and carbon only. Manganeſe may perhaps ſometimes be preſent in it, when particular ores are employed for ſmelting, but its union muſt be conſidered as accidental.

To make pure iron, therefore, we have, from theſe concluſions, only to extricate the carbon. This may be done, in ſmall maſſes, by ſtratifying the articles in a cloſe veſſel with ſome ſubſtance containing oxygen. The poorer iron ores, which are free from ſulphur, are uſed in powder for this purpoſe; and after the materials have been expoſed to a heat juſt ſhort of the fuſion of the metal, the air being completely excluded, the carbon will become diſſipated, and the iron left in a ſtate of purity. See CASTING and FOUNDERY.

§ 4. *Converſion of Pig-iron into malleable Iron, and Steel.*

1. *Bar, or wrought Iron.*—Iron, as obtained by the reduction of its ores in the blaſt-furnace, contains, as we have before ſtated, a certain proportion of carbon, which renders the metal unfit for the various purpoſes of forging, but conſtitutes its principal value as applicable to the uſe of the founder. To deprive it of this ingredient certain proceſſes are gone through, the object of which is, by the concurrent action of heat and air, to diſſipate the carbon under the form of an elaſtic compound. The kind of iron choſen for the converſion is that denominated by manufacturers *forge-pig*. It is the loweſt quality made for the purpoſes of art; and, in conſequence of its being combined with a ſmaller doſe of carbon than any other, which thus cauſes it to bear a leſs price in the market, is doubly preferable for the end required.

The price of *pig-iron* is almoſt excluſively determined by the quantity of carbon which is in combination with it. The varieties uſually diſtinguiſhed are N° 1, otherwiſe called *grey*, *ſmooth-faced*, or *liſey*, metal; N^os 2 and 3, and *forge-pig*. The proportion of carbonaceous matter preſent in theſe varieties is differently ſtated by different experimentaliſts. Clouet makes the higheſt proportion to amount to $\frac{1}{4}$th; but from the reſults obtained by Mr. Muſhet in combining iron *directly* with the doſes of charcoal requiſite to produce its various ſub-carburets, [illegible]th appeared to be the *maximum*. Of this, the following table, publiſhed by him in the 13th vol. of the Philoſophical Magazine, will afford the neceſſary proof.

Soft caſt ſteel	[illegible]
Common ditto	[illegible]
Same, but harder	[illegible]
Ditto, too hard for drawing	[illegible]
White caſt-iron (ſame as before called *forge pig*)	[illegible]
Mottled caſt-iron (N° 2.)	[illegible]
Black caſt-iron (N° 1.)	[illegible]

The firſt ſtep in the proceſs of decarbonization, according to the more common mode of operating, is to expoſe the iron in a furnace, called by ſome a *refinery*, but by others, to diſtinguiſh it from one hereafter to be deſcribed, a *run-out furnace*. It conſiſts of a veſſel open at the top, imbedded in ſtone or brick work, about two feet three inches long, two feet wide, and ten inches deep. This is generally, in part, conſtructed of caſt iron ; and, when ſo made, has an outer caſe about two or three inches diſtant from the inner one, which is conſtantly ſupplied with a ſtream of cold water to prevent the apparatus from melting. The iron to be decarbonized is placed in this receptacle, and kept in a continual ſtate of fuſion for three or four hours by the aid of a coke fire, which is heaped to a conſiderable height above the level of the veſſel, and extended proportionally on the hearth that ſurrounds it. The ſize of the hearth is moſtly about three yards in length, and from two to three wide, and is completely covered by the funnel of the overhanging chimney. Bellows of conſiderable ſize are employed to carry on the proceſs ; and the current of air which iſſues from them is directed immediately on the ſurface of the iron by one or more *tuyeres*. Theſe *tuyeres* are double, like the caſe, and continually cooled by the application of the ſame means. When the decarbonization is completed, the metal is let out at an opening in the ſide, which has been kept cloſe during the operation by a *ſtopping* of ſand. It flows into a groove about 18 inches wide, and ſix or ſeven feet long, conſtructed of ſtone in the floor that ſurrounds the furnace. The bottom of the veſſel is ſo placed as to be nearly on a level with the floor ; the only elevation given to it being what is merely ſufficient to let the iron run out with facility. A conſiderable quantity of vitreous oxyd is formed during the proceſs ; and the loſs in the weight of metal, which is ſtated to amount to from $\frac{1}{6}$th to $\frac{1}{7}$th, is principally referable to this circumſtance. The total quantity of carbon which the iron contains originally is not eſtimated at more than $\frac{1}{25}$ th ; and yet the approach of it to the pure ſtate, or, in technical language, to the ſtate of *bar* or *wrought iron*, after this operation, is very inconſiderable.

The cake of metal procured by theſe means is broken into lumps of a convenient ſize, and ſubjected, in a furnace of another deſcription, to a proceſs known in the art by the name of *puddling*. The furnace, which is alſo diſtinguiſhed by the ſame term, is a variety of the reverberatory ; and at the immediate point where the flame ſtrikes upon the hearth, a ſhallow concavity is worked out, in which the melted iron is expoſed. Oppoſite to it is a door, and through this the metal is kept in continual agitation, by means of a ſort of rake, for the purpoſe of exhibiting freſh ſurfaces perpetually to the influence of the air. Water is likewiſe occaſionally thrown in, which in ſome degree contributes to the decarbonization. With the loſs of carbon, the iron alſo loſes its fuſibility, and about the middle ſtage of the operation appears in the form of ſmall detached lumps, which ſcarcely ſeem to exert any affinity for each other. At length, however, by much ſtirring, and frequently preſſing them together, they cohere into a pulpy maſs ; and being gathered into pieces of a convenient ſize, are carried under rollers, where, after paſſing through four pairs, in ſucceſſion, of a gradually diminiſhing guage, they are produced into plates ſeven or eight inches wide, and three feet or more in length. Conſiderable quantities of matter are ſqueezed out in the rolling, which principally conſiſt of a vitreous kind of oxyd. This is, for the moſt part, to be referred to the action carried on in the furnace ; but ſome portion of it is, in all probability, created by the combuſtion of ſmall pieces of fluid metal, which, engaged amongſt the particles of the *puddled* maſs, are hurled through the air in a ſtate of vivid inflammation, by the compreſſive violence of the rollers. The total loſs thus ſuſtained is eſtimated at from $\frac{1}{6}$th to $\frac{1}{7}$th. The plates obtained by this treatment have a very incompact appearance ; and if attempted to be worked in the ſtate they are then preſented under, would crumble almoſt wholly into ſmall granulated lumps. To impart to them the neceſſary cloſeneſs and ſolidity, they are again heated in another kind of furnace, and beaten forcibly with a heavy hammer, which is raiſed by machinery.

Previouſly to being thus treated, they are broken up into cakes of ſmall ſize, and placed upon circular ſlabs of ſtone from 8 to 12 inches in diameter. The ſize of the cakes is in a great meaſure determined by a particular effect of the laſt pair of rollers that they are paſſed through : ribs, of a diamond ſhape, girding either one or both of them, on the whole extent of their ſurface, which leave a deep indentation on the plates, ſo as to render them eaſily frangible in that direction. The height to which theſe cakes are piled on the circular ſlab juſt ſpoken of, is generally about 12 inches ; and when ſo prepared, they are placed on the hearth of a reverberatory furnace, which differs but little in form from that employed for *puddling*, except in being flat at the bottom inſtead of concave. The furnace is denominated a *balling furnace ;* and the piles of metal, *pies* or *balls*. They are continued in this ſituation until they have arrived at a welding heat, and are then removed by large tongs under the ſtroke of the hammer. Near to the place a ſmith's forge is kept in blaſt, where long bars of iron are alſo urged to the welding point ; and, after the firſt ſtroke or two of the hammer, united to the *balled* maſſes, to afford greater convenience in turning them. The maſſes are beaten out into ingots of about three feet in length ; and the bar laſt mentioned being ſeparated, they are divided deeply by an inſtrument termed a *ſet*, to facilitate their being afterwards broken ; and the proceſs is then completed. They are in this ſtate called *blooms*, and have yet to undergo another operation, for the purpoſe of being made into bars or plates. Much loſs is ſuſtained by the laſt treatment, and principally from the ſame formation of oxyd as was noticed in the preceding caſe. The quantity thus loſt, added to the waſte occaſioned in the *bloomery*, which comes next to be deſcribed, is uſually conſidered as equal to $\frac{1}{5}$th of the metal obtained by *puddling ;* which will make the total deficiency, by all the operations, as nearly equivalent to $\frac{3}{5}$. The ingots or *blooms*, which are received from the hammer, after being broken, over a ſmall wedge-ſhaped block of iron called a *tup*, are placed in a ſpecies of reverberatory, very ſimilar to the *balling furnace,* and denominated a *blooming furnace*, or *bloomery*. They are here heated to welding, and then ſubmitted to the requiſite preſſure under rollers, which are either plain or grooved, according as the iron is wiſhed to be obtained in plates or in bars. This completes the whole of the proceſſes neceſſary for making the beſt malleable iron ; and it reſults from the obſervations which have been premiſed, that, in order to procure one ton of it, five-and-thirty hundred weight of *forge-pig* is previouſly required.

Two other modes of operating are at preſent in uſe ; one of which omits the *puddling*, and the other, that part of the foregoing proceſs that concerns the fabrication of *blooms*. In the former, iron is expoſed to the heat of a charcoal fire, in a ſpecies of furnace preciſely ſimilar to the one before deſcribed as a *refinery*, or *run-out furnace ;* and is continued in that ſituation, until the metal is thought to be ſufficiently decarbonized. It is very frequently ſtirred during the operation ; and when brought *into nature*, (to uſe the technical expreſſion,) is collected into maſſes, and removed by tongs under a large hammer, denominated, as applied to this particular uſe, a *ſtamping hammer*, where it is beaten into cakes, which are afterwards broken up, and treated in the *balling furnace* as before deſcribed. This is the old mode of working, and the iron obtained from it is by many conceived to be of very ſuperior quality. The heat produced is conſiderably inferior to that afforded by coke in the *run-out furnace;* and the iron is leſs ſurrounded by the fuel than in the caſe juſt mentioned. The preſent charcoal fire is properly a *refinery*, and not the one which is uſed merely as a preliminary to the proceſs of *puddling*. Here, the buſineſs of decarbonization is at once completed; and the reſulting metal is in the ſame ſtate of purity as that yielded from the rollers, after it has been *puddled* by the other method. *Balling* and *blooming* follow in regular ſucceſſion, and plates or bars are produced exactly as before.

According to the ſecond mode of treatment, in which *blooming* is omitted, the maſſes obtained from the *balling furnace* are reduced under the hammer into the form of ſolid, cubical blocks; and when their temperature is too much lowered to be capable of any farther working, they are again heated in a fire called a *chafery*, which is urged by a powerful pair of bellows, and ſcarcely differs from a common ſmith's forge, except in being larger, and the cokes upon it being heaped up to the unuſual height of at leaſt two feet. In this ſituation they are raiſed to the point of welding, and afterwards hammered out into ingots of a flattened ſhape. Iron bars are united to them very ſhortly after they are brought from the *balling furnace,* to afford a greater facility of management, in the ſame manner as was deſcribed in the making of *blooms;* and theſe, as before, are detached, when the ingot is ſufficiently formed. The iron produced in this way is not conſidered ſo good as that afforded by either of the other proceſſes, and is employed, for the moſt part, in the commoner ſervices of art. Repeated rolling, or hammering, is the only means of imparting the fibrous texture ſo neceſſary to good bar iron; and as this treatment is leſs frequent in the preſent mode of operating, the deficiency of value in the material obtained may very probably be referable almoſt excluſively to this circumſtance.

The above include the whole of the *important* variations that are preſented in the manufacture of bar iron. Other ſhades of diſagreement may be traced in different works; but they are of a nature too trifling and unimportant to merit any particular enumeration. The art is ſtill in its infancy; and the light of chemical ſcience, by being brought to a focus here, cannot fail to diſcloſe many improvements in the preſent modes of procedure, which will greatly abridge the expence now incident to this valuable branch of national induſtry. That the mere abſtraction of about 4 *per cent.* of carbon ſhould require a ſacrifice, in effecting it, of above 40 *per cent.* of iron, appears monſtrous beyond example: and as thoſe who are connected with the art become more ſcientific in their views, we ſhall unqueſtionably find that it will be much more economically accompliſhed.

When iron has been completely freed from carbon, and has acquired its higheſt degree of malleability by repeated hammerings, it is by far the moſt tenacious of all the metals, and is capable of being drawn into the fineſt wire.

The tenacity of iron, as well as of all the reſt of the malleable metals, varies conſiderably according to its ſoftneſs. After iron has been kept in a red heat for ſome time, and ſuffered gradually to cool, it becomes remarkably changed in point of ſoftneſs. By being hammered, drawn into wire, or rolled, it increaſes in hardneſs to a certain extent; but, at the ſame time, partly loſes its malleability. By this mechanical treatment, when cold, its ſtrength or tenacity increaſes; and it may be taken at one point, when it will require a far greater weight to break it, than if it were hammered either more or leſs.

All the experiments yet publiſhed relative to the tenacity of iron, and the other metals, are on this account very defective. The writer of this article has ſeen an iron wire, when newly annealed, break with a weight of 50 pounds; but, after being drawn through two holes of a wire-plate, bear above twice that weight, without ſuſtaining injury. Iron, when properly annealed, will bear more bending backwards and forwards before it breaks, than in any other ſtate: but the ſtrength, or that power which reſiſts a weight, exerted longitudinally to break it, is jointly as the laſt property and its hardneſs. Hence the reaſon why its ſtrength is increaſed with a certain degree of hammering. The ſpecific gravity of malleable iron, according to Briſſon, is 7.788; that of pig iron being 7.207. Iron, in a ſtate of purity, requires ſo great a heat for its fuſion, that the beſt crucibles are nearly ready to melt with it. It has, however, been fuſed, and caſt into an ingot. It is ſaid to liquify at 158° of Wedgewood. Its malleability is greatly increaſed by heat; and by raiſing it to a very high temperature, it becomes exceedingly ſoft, and may be brought ſo near to abſolute contact with another piece ſimilarly heated, that they unite firmly together. This proceſs is called *welding*. Its great affinity for oxygen, when heated to a welding point, would very ſoon reduce it to an oxyd, if it were not for the vitreous matter fuſing upon its ſurface; and it may be ſtill more completely defended, by dipping it in powdered glaſs or ſand. See *Deſcription of Plates* at the end of the article.

2. *Steel.*—This ſubſtance, which is a compound of iron and carbon, but in leſs proportion than that of pig iron, is of ſuch diſtinguiſhed importance in moſt of the arts, that no other ſubſtance could be ſubſtituted, capable of ſupplying its united properties of hardneſs, tenacity, and elaſticity. After the pig iron is totally deprived of carbon, and becomes malleable, the metal can be re-impregnated with that ſubſtance to a certain extent, without loſing much of its malleable property.

It is curious to remark, that although we have made iron of excellent quality in this country, for all the nice purpoſes to which it is capable of being applied, yet, in attempting to convert it into ſteel, we have always failed; the ſteel being red-ſhort, and otherwiſe bad. It, of late, however, has been ſo great a deſideratum to obtain ſteel from Britiſh ore, in conſequence of our want of communication with Sweden and Ruſſia, that ſeveral efforts have been lately made to bring about this deſirable object, and not altogether without ſucceſs. We may yet entertain a hope, therefore, that the time *will* arrive, when we ſhall not be dependent on other countries for this uſeful commodity.

The only ſteel at preſent, on which perfect reliance can be placed, is made from ſome of the beſt marks of Swediſh iron. The bars are ſtamped with certain letters or characters, well known to the ſteel-makers; and ſome of them have preſerved their character for making good ſteel during a long ſeries of years.

The ſize of the bars varies from 3 inches broad and $\frac{1}{2}$ inch thick, to about 2 broad by $\frac{7}{16}$ thick.

Nothing more is neceſſary to impregnate the bars of iron with carbon, by which they become ſteel, than to ſtratify them with powdered charcoal in a cloſe veſſel, called a cementing pot; expoſing the ſame to a degree of heat as little ſhort of what would fuſe the ſteel as poſſible.

The furnace in which the proceſs of cementing bar iron is performed is called a converting furnace.

The pots are made of a peculiar ſtone called fire-ſtone, from its joint property of not being liable to crack by the heat, and its little diſpoſition to enter into fuſion. It is a fine grit, and occurs abundantly in the neighbourhood of Sheffield. The interior of theſe pots is in dimenſions from 12 to 15 feet long, and from 2 feet to 30 inches ſquare. Every furnace contains two of them; and they generally hold about 5 tons of iron each. The metal is ſtratified with the charcoal duſt, in ſuch a way that each bar may be completely covered; and the laſt ſtratum, which ſhould be thicker than the reſt, is kept cloſe with a mixture of clay and ſand, ſo as to prevent the charcoal beneath it from entering into combuſtion with the outer air.

The fire is then gradually applied, and the exterior ſurface of the pots conſtantly enveloped with flame, till the whole maſs has become of the heat required. This heat is kept up for a conſiderable time, ſo that from the commencement of firing to the maximum is about ſeven days. The ſame ſpace is afterwards required to allow the maſs to cool. This rule, however, is not ſufficient to tell when the cementation is perfect. A hole is generally left in the front of the furnace, paſſing through the wall to the interior of the pot. One or two bars are laid with their ends projecting into the opening, which is looſely filled with powdered charcoal. When the proceſs is ſuppoſed to have gone on long enough, one of theſe bars is drawn out and examined.

All bar iron muſt, owing to the manner in which it is made from the pig, contain a ſmall portion of oxyd of iron, as well as ſome remains of iron not completely deprived of its carbon. The long continued heat which this proceſs requires, cannot fail to cauſe an union between the oxygen and carbon, accidentally exiſting in the bars; and we may expect, in conſequence, that an elaſtic fluid will be formed, which muſt be either carbonic acid or the carbonic oxyd; but ſince the oxyd is in the ſtate of finery cinder, we ſhould rather conceive it to be the latter; and we believe experience warrants the concluſion.

This elaſtic fluid, when the metal is ſo near the fuſing point, cauſes the ſurface of the bars to be covered with bliſters, which are a ſure ſign that the cementation is complete: and it is from the number and ſize of theſe bliſters, that the workmen know when to ceaſe adding fuel to the furnace.

Steel is made of different degrees of hardneſs, by giving it more or leſs carbon; and this is effected by keeping up the heat a longer time, ſtill having regard to the quantity and ſize of the bliſters.

The ſteel uſed for coach-ſprings contains the ſmalleſt quantity of carbon; a ſomewhat greater proportion is required for table knives, forks, carpenters' tools, and agricultural implements; and the largeſt doſe of all is wanted for files, which can ſcarcely be too hard, if the ſteel be ſufficiently malleable to work.

Steel, in the ſtate it comes from the cementing furnace, is called *bliſtered ſteel*, from the appearance we have juſt deſcribed. It is not uſed but for common purpoſes, although formerly we had no other kind. The bars of iron being formed under the forge hammer, and produced in a country not remarkable for the excellence of its machinery, the metal is found to abound with numerous ſeams and ſhells, which good workmanſhip might in a great meaſure avoid.

This evil is, however, very happily remedied, by making the bliſtered-ſteel into what is called *ſhear-ſteel*, and *caſt-ſteel*.

Shear-ſteel has derived its name from the advantage with which it has been applied in the manufacture of ſheep-ſheers. Its admirable property of welding to iron, without the other qualities it poſſeſſes being injured, renders it of great importance in all caſes where the body of the edge-tool is conſtructed of iron, and the edge merely ſteel.

From having been firſt made at Newcaſtle-upon-Tyne, it has alſo been called *Newcaſtle ſteel*. The apparatus uſed for its manufacture conſiſts of a pair of bellows, or other blowing machine, and a fire place ſimilar to that of a ſmith's hearth, but upon a larger ſcale. The hammer for drawing the bars is larger than a tilting hammer, but ſmaller than the one employed at an iron forge.

In order to make ſhear-ſteel, a number of bars of the beſt bliſtered-ſteel are laid together, and temporally faſtened. In this ſtate they are introduced into the fire, and heated to a welding temperature; after which they are firmly united by means of the hammer, and drawn. At a ſecond heat theſe maſſes are beaten down into bars about $1\frac{1}{2}$ inch broad and $\frac{3}{8}$ths of an inch thick. By this proceſs the looſe parts and ſeams of the bars are cloſed together, and the ſteel is rendered ſuſceptible of a poliſh, of which before it was not capable. But theſe are not the only advantages. The additional hammering ſo far improves its malleability, that the tenacity it enjoys is much greater, while its hardneſs is very little leſs.

This ſteel is particularly adapted for ſprings of every deſcription, and for all edge-tools requiring great tenacity rather than hardneſs.

Caſt-ſteel is entirely free from the mechanical defects which belong to bliſtered-ſteel, and even, in ſome degree, to ſhear-ſteel; ſince it conſiſts of the latter variety completely fuſed, and caſt into ingots.

The furnaces employed for this purpoſe ſhould poſſeſs all the advantages which can be given to air-furnaces, on account of the great heat requiſite for the proceſs. (See FURNACE.) The crucibles, in which the ſteel is melted, are made of Stourbridge clay, mixed with a ſmall quantity of powdered coke, which makes them leſs liable to crack in the heating or cooling; and, at the ſame time, gives to them a conſiderable degree of ſtiffneſs in the fire, when raiſed to the very great heat required. Theſe crucibles are furniſhed with covers, which are of rather more fuſible clay than the body of the veſſel, and, on that account, are ſoon partially vitrified; by which means they become cloſely luted at the time the ſteel is at a temperature ſufficiently high to be deſtroyed by the oxygen of the atmoſphere.

The fuel employed for melting ſteel, conſiſts of the hardeſt cokes, and in all caſes where long continued and high temperatures are neceſſary, cokes of this deſcription ſhould always be employed. Two advantages attend the uſe of them; for although the ſoft cokes produce a very great heat during a ſhort ſpace, yet the length of time required for melting ſteel would oblige the workman to charge the furnace too often; ſo that he would ultimately get a greater heat by the permanence of the hard coke; and the ſpecific gravity of the latter is ſo much greater than the ſoft, that the fuel is more condenſed, and hence, allowing for the difference of coheſion, will give more concentrated heat, if the ſupply of air be ſufficient.

The crucibles are of a ſize ſufficient to hold about 30lbs. of ſteel; and, in general, each will bear charging three times, or even four: ſome would remain ſound ſtill longer than that, if the fires were continued; but they are ſeldom kept in more than twelve hours in the day, and this will not allow of more than three heats. For the beſt poſſible caſt-ſteel, the bars of the beſt bliſtered-ſteel are broken into ſmall pieces, it being, on coming from the cementing furnace, ſufficiently brittle for this purpoſe. An inferior kind of caſt-ſteel is made from the ſcraps, which conſiſt of the waſte of the manufactories. The heat required to melt ſteel is very great; and inverſely as the quantity of carbon combined with it. Before caſt-ſteel making was brought to great perfection, the quantity of carbon given to it was greater, in order to effect its more eaſy fuſion. The crucibles and furnaces, however, are now ſo much improved, that the ſteel can be melted with much leſs carbon, and it is, in conſequence, ſo *kind*, to uſe a technical phraſe, as to weld with iron, and even to be capable of uniting two pieces of it together.

After the ſteel has become ſufficiently fluid, it is poured into caſt-iron moulds, which form it into ingots of an octagonal ſhape; and are about 30 inches long, each weighing about 30lbs. Formerly, the great ſecret of making caſt-ſteel was ſaid to conſiſt in uſing ſome peculiar flux. No ſubſtance, however, from what has been obſerved, can increaſe the fuſibility of the ſteel, but an additional doſe of carbon, which is improper after a certain quantity has been united with it. The only ſubſtance, therefore, which can be employed to any advantage, muſt be ſome fuſible vitreous matter, capable of floating upon the ſurface of the metal, and defending it from the contact of air.

The flux at preſent uſed, and the moſt proper for this purpoſe, is the blaſt-furnace cinder. But pounded glaſs, or any vitreous ſubſtance which fuſes a little before the metal melts, will anſwer equally well.

The ingots of caſt-ſteel, as well as the bars of bliſtered-ſteel, and ſhear-ſteel, are drawn into rods ready for forging into various articles, by a piece of machinery called a *tilt*, or *tilting-mill*. (See TILTING-MILL.) By this hammer, the caſt-ſteel can be drawn down to the ſize of $\frac{1}{4}$ inch ſquare. But in reducing ſmaller than that, it would be liable to be injured in its fabric. It is drawn into rods of ſmaller ſize by hand, for the purpoſe of making gravers, and watch-makers' tools: and for ſtill more delicate articles, it is manufactured into wire. The bliſtered-ſteel will not bear drawing to a ſmall ſize, on account of the looſeneſs of its texture.

Steel is of a mean ſpecific gravity between wrought and pig-iron; and, like the former, it increaſes its property in this reſpect by hammering. Like iron, too, it becomes ſofter on being annealed, but never becomes ſo ſoft as that metal. When of good quality, and at a certain degree of hardneſs, it is ſtronger than iron; that is, when ſtretched longitudinally by a weight; but, by ſudden bending or twiſting, it is more liable to break ſhort. In working it with the hammer, it will not bear ſo great a heat as iron; ſince the temperature iron and its combinations ſuſtain without melting, is inverſely as their doſe of carbon.

This property of bearing heat, is, however, in a ſtill leſs ratio in caſt-ſteel. This is owing to its having entirely loſt its fibrous form in the melting. Hence there is leſs danger in heating it after it has been hammered.

In welding ſteel to iron, or ſteel to ſteel, the fire ought to be very free from ſulphur, or other extraneous matter; and the heated parts of the rods ſhould be frequently ſupplied with either ſand, or ſand mixed with the ſcales which come from the hammered iron. This fuſes upon the ſurface and keeps off the air. See FORGE.

The moſt ſingular property which belongs to ſteel, is that of its hardening by being heated red-hot, and cooling rapidly. This change is greater the hotter the ſteel, and the colder the fluid into which it is plunged. (See CUTLERY.) Water, in general, is employed for this purpoſe; and ſpring-water is better than any other. If the water abound with animal or vegetable matter, the hot ſteel cools more ſlowly. This is occaſioned by a film of the matter in ſolution forming and remaining upon the ſurface, and, being a bad conductor of heat, prevents the ſteel from cooling. File-makers ſay, that the ſalt which is inevitable in their hardening water, makes the ſteel harder, and they ſometimes put ſulphuric acid into it for the ſame purpoſe.

In hardening ſteel in thin plates, ſuch as ſaws, particularly when of caſt-ſteel, quenching in water would cauſe them to crack, and make them ſo hard as not to be uſeful. They have, in conſequence, recourſe to ſome ſubſtance which is not ſo good a conductor of heat. Oil, with tallow, bees' wax, and reſin diſſolved in it, is generally employed for theſe articles. (See the article SAW.) If the ſteel be heated red-hot, it moſtly returns to its original ſtate. This, however, is ſometimes not the caſe with thin plates of caſt-ſteel. In giving various degrees of heat from the hard ſtate, it becomes more ſoft and leſs elaſtic. See CUTLERY.

This curious and valuable property which it poſſeſſes might, at firſt view, appear to be cauſed by an increaſe of denſity; but the ſpecific gravity of hardened ſteel is leſs than before it is hardened. It has been ſaid to depend upon a certain cryſtalline arrangement of its particles; but this is a mere apology for ignorance. The moſt plauſible theory we have heard of is mentioned in one of Dr. Darwin's notes to his "Botanic Garden," and was the idea of a very ingenious friend of that celebrated author. This theory was equally applied to the ſingular property poſſeſſed by the glaſs toys known by the name of *Prince Rupert's Drops*. It is as follows. When the heated ſteel or glaſs is plunged into water, the exterior ſtratum becomes ſo hard and ſolid, as not to be capable of ſhrinking; and every ſucceeding layer is to a certain degree placed in the ſame ſituation. When caloric leaves a body ſlowly, it contracts in its dimenſions, until it aſſumes ſomething near its original volume. But if any force prevent the parts from approximating, the molecules will attract each other with a power equal to the repellent energy of the caloric that cauſed the expanſion. So ſoon, however, as the outer ſtratum is broken, the whole of the others are deſtroyed in ſucceſſion. This is moſt glaringly the caſe with the glaſs drops before ſpoken of, and, to a certain extent, with unannealed glaſs, and hardened ſteel.

With reſpect to the latter, however, it is confined to large maſſes, and particularly of caſt-ſteel. The rollers employed by jewellers and others are of caſt-ſteel, and are very liable to break in the hardening, although about half the maſs in the middle is pure iron. They do not always crack at the time, but at different periods afterwards, and frequently, when no violence is applied to them, ſome have been known to fly ſix months after being finiſhed. Sometimes they break with great report, and what ſtrengthens the above opinion as to the cauſe is, that the figure of the roller is frequently changed from a round to an elliptical ſhape. For farther particulars, ſee STEEL.

§ 5. *Chemical Properties.*

When a piece of poliſhed iron is expoſed to the air, it ſoon loſes its luſtre; and if the atmoſphere be humid, it becomes covered with red ſpots called *ruſt*. When it is expoſed at 400 degrees of Fahrenheit, it changes to a yellow colour. The temperature being increaſed, the colour gradually turns to a brown, and at the heat of about 600 it becomes of a beautiful blue tint. This change of colour ariſes from the combination of oxygen;

the quantity increaſing with the temperature. If the ſurface be defended by a coating of chalk and a ſolution of glue, no change of colour takes place when the heat is applied. In the art of blueing ſteel, advantage is taken of this method to make the blue ornamental.

In a higher temperature the ſurface becomes covered with a ſcaly cruſt, which is compoſed of oxygen and iron; and in the heat of a ſmith's forge, it combines with oxygen ſo rapidly as to burn, throwing off ſparks in bright corruſcations. If ſmall iron wire be expoſed in pure oxygen gas, the end being ignited with a bit of greaſed cotton, the metal enters into brilliant combuſtion, and a globule of melted matter is formed at the end of it. The iron ſo burnt loſes all its metallic properties, by combining with the oxygen; and during this change the phenomena of burning take place. The globule is ſo brittle as to be capable of being reduced to powder, and is called the black or vitreous oxyd of iron.

Iron has ſo great an attraction for oxygen, that it decompoſes water even in the cold. When filings of that metal are mixed with water in a veſſel connected with a pneumatic apparatus, an elaſtic fluid is evolved, which is found to be hydrogen. The iron loſes its metallic luſtre, and ultimately is converted into the black oxyd before ſpoken of.

If this mixture be in a retort, and the boiling heat applied, the iron combines with the oxygen of the water with much greater rapidity; and, of courſe, a much greater quantity of hydrogen is eliminated. This method has been employed to obtain the black oxyd of iron, which was formerly called *Martial Ethiops*. Iron decompoſes water with very great rapidity, when the ſulphuric or muriatic acid is preſent. The acid takes up the oxyd as it is formed by the agency of the water, and a new ſurface is conſtantly preſented. A large quantity of hydrogen is in this proceſs diſengaged, and it is by the preſent method that this gas is procured for filling aëroſtatic machines, and for other purpoſes. If the oxyd which is taken up by the acid be precipitated by an alkali, and dried inſtantly, it will exhibit a ſimilar appearance to that obtained by the action of water alone. When firſt ſeparated it has a green appearance, which it owes to the preſence of water; and this being diſſipated by heat, it is left of a dark-grey colour. This oxyd, formed by either of the above proceſſes, is called the prot-oxyd of iron, becauſe it is combined with the *firſt* or ſmalleſt doſe of oxygen. According to Prouſt and Lavoiſier, it conſiſts of 73 of iron, and 27 of oxygen.

If the prot-oxyd of iron be expoſed to the air in a red heat for a length of time, it aſſumes a red colour, and conſtitutes the ſubſtance known in the arts by the names *crocus* and *colcothar*. This change of colour is found to have been cauſed by its combining with an additional doſe of oxygen, and the product is denominated the peroxyd, conſiſting, according to Prouſt, of 52 iron, and 48 oxygen. From the beſt chemical authorities, it appears that iron unites with oxygen only in two fixed proportions, conſtituting the prot-oxyd and the peroxyd; although it has been held by ſome that there are more varieties.

If a bar of iron be heated red-hot, and a ſtick of ſulphur applied to it, a fluid ſubſtance will drop from its end, which is found to be compounded of ſulphur and iron, and in chemiſtry is called ſulphuret of iron. The fuſion of ſulphur and iron-filings, in a crucible, gives a ſimilar product. The attraction between theſe ſubſtances is ſo great, that their union in nature is very common.

Iron-filings, mixed with ſulphur, and made into a paſte with water, in a certain time become very hot and even produce flame. The mixture is ſometimes buried under ground to produce an artificial volcano. This phenomenon, however, does not depend upon the immediate combination of the ſulphur with the iron. The water, which is a conſiderable agent, is decompoſed; the oxygen uniting with the iron to form an oxyd of iron, and with the ſulphur to form the ſulphuric acid, while the hydrogen combines with another portion of the ſulphur producing ſulphuretted hydrogen, which occaſions the flame in the experiment.

When iron-filings are heated with ſulphur, even where oxygen is not preſent, at a little ſhort of the temperature of redneſs, they combine and produce flame. We are indebted to the aſſociated Dutch chemiſts for this fact, as well as a ſimilar experiment with ſulphur and copper.

The artificial compound of ſulphur and iron, from the experiments of Prouſt, is compoſed of 62.5 ſulphur
37.5 iron
100

The native ſulphuret is found to contain a greater proportion of ſulphur. When heated in a cloſe veſſel, ſome of the ſulphur ſublimes, and may be collected in a proper apparatus. By this treatment, it is reduced to the ſtate of common ſulphuret, and loſes 20 *per cent.* of its weight. It is hence compoſed of 50.6 ſulphur
49.4 iron
100

According to ſome experiments made by Mr. Hatchett, however, theſe proportions are not regular in ſpecimens where the cryſtalline form varies. This ingenious chemiſt has found a native ſpecies agreeing in the proportion of its conſtituents with the artificial ſulphuret. It is what has been called magnetic pyrites; and is by this teſt of the magnet diſtinguiſhed from the common pyrites, which does not poſſeſs that property. It has alſo another peculiar character. If dilute ſulphuric or muriatic acid be poured upon it, a rapid action takes place, and ſulphuretted hydrogen is evolved. This is not the caſe with the ſuper-ſulphuret till it has been expoſed to heat, when it loſes its exceſs of ſulphur. The common ſulphuret of iron has been employed to make artificial magnets. Mr. Hatchett found that not only the ſulphurets, phoſphurets, and carburets, were ſeparately magnetic; but ſuſpects that certain proportions of all theſe may conſtitute a *maximum* of magnetic virtue.

It is highly probable, that the iron is the only ſubſtance poſſeſſing magnetiſm; and that the facility with which theſe compound ſubſtances become magnetic, may ariſe from the greater eaſe with which the particles of iron aſſume the peculiar arrangement on which this curious property depends. That ſome arrangement, though perhaps equally myſterious with cryſtallization, may be the cauſe of magnetiſm, there is much reaſon to believe. By mixing iron-filings with melted reſin, and incloſing them in a braſs tube, if a magnet be brought near to the tube, while the maſs is ſtill liquid, the whole, when cold, will become a magnet. During the touching of a piece of ſteel to make it magnetic, there is little doubt but that a new and peculiar diſpoſition takes place amongſt the particles, notwithſtanding the ſolid ſtate of the metal. The particles of bodies appear to be free to motion in the ſolid form. We find that iron combines with carbon, while both bodies are in that ſtate; and what is ſtill more curious, the compound aſſumes a different cryſtalline ſtructure, according to the proportions of the two bodies. Oxygen appears, in ſome inſtances, to alter the internal arrangement of ſolid bodies. If braſs, for example, were to be kept in a damp room, but more particularly where the fumes of acids are preſent, the metal, although previouſly very tenacious and ductile, becomes ſo brittle, as not to bear bending to a right angle; at the ſame time that the broken ſurfaces exhibit a cryſtalline fracture. That ſpecies of form, therefore, under which magnetiſm exiſts, may be brought about by various means. All iron inſtruments, kept in one poſition for a length of time, become magnetic; eſpecially if that poſition coincide with the magnetic meridian. We regret that ſo little is known on this intereſting ſubject; and for farther particulars refer to the article MAGNETISM.

Iron combines with ſeveral of the metals forming alloys, none of which have very ſtriking or uſeful properties. The alloy of iron and gold has been examined by Mr. Hatchett, who found that 11 parts of gold to 1 of iron formed a malleable alloy, remarkably ductile, ſo as to roll into plates, and be capable of being ſtamped into coin. The colour was of a pale yellowiſh-grey, and it was of the ſpecific gravity of 16.885. The moſt ſingular property of this alloy is its increaſe of volume by combination. Before the union, the bulk was 2799; and afterwards, 2843. The very contrary is the caſe with moſt of the other alloys of metals, and agreeably to Berthollet's doctrine of affinity, we find that the mean ſpecific gravity of bodies by experiment, is greater than the arithmetical mean, directly as the affinity of the bodies. We ſhould, therefore, in this inſtance conclude, that either the affinity of the metals is trifling, or that the above law is not general.

The alloy of pure iron with platina has not been effected from the great infuſibility of the two metals. Dr. Lewis alloyed caſt iron with platina, as well as ſteel. The ſpecific gravity of this alloy, contrary to the laſt, was greater than the arithmetical mean. It was very hard and tenacious, poſſeſſing ſome degree of ductility.

After being kept ten years, it was little tarniſhed. Iron is eaſily alloyed with ſilver. In equal parts they form a compound of conſiderable ductility, of the colour of the latter metal, but much harder; and is attracted by the magnet. The metals ſeparate, in ſome degree, when kept in fuſion; but, according to the experiments of Morveau, not completely; the ſilver retaining ſome of the iron, and the iron ſome of the ſilver, by which its quality, as a metal, is much improved. Iron is not eaſily combined with copper in large quantity. We find, however, that theſe metals are capable of uniting, and the alloy is, in ſome degree, magnetic. Indeed, in forming certain inſtruments of braſs, where the magnetic needle is employed, they are frequently defective from this circumſtance. To free copper entirely from iron, it ſhould be rediſſolved in an acid. The oxyd, after precipitation, ſhould be diſſolved in aqua ammonia, and the alkali then diſtilled from it. This being afterwards treated in a cloſe veſſel with ſome inflammable matter, the metal will be obtained pure. The alloys of tin and iron, and that of iron with zinc, may be formed by mixing clean iron-filings, or turnings, with thoſe metals while in a ſtate of fuſion. Theſe compounds are not of any uſe. Iron may be ſoldered with ſeveral of the metals. Copper, gold, and ſilver, unite to it with great facility; but require the preſence of borax to keep off the air.

The moſt permanent ſolder for iron is the carburet of the ſame metal, called N° 1, pig-iron. The pig-iron loſes ſome of its brittleneſs, and the malleable metal becomes much harder. It does not appear improbable that ſteel might be formed by uniting theſe two ſubſtances together in certain proportions.

We have next to treat of the ſalts of iron, or its combinations with acids.

Sulphat of Iron.—Sulphuric acid does not combine with iron in its metallic form; in conformity with the general law that no acid unites with a metal till the latter is previouſly oxydated. Iron is but ſlightly acted upon by this acid in the cold; but with a degree of heat far ſhort of boiling, the iron takes from it a portion of oxygen, converting it into the ſulphurous acid, which eſcapes in the form of gas. The iron, thus oxydized, combines with another portion, and forms the ſulphat of iron.

When water is added to the iron and the acid, a much more rapid action takes place. The metal ſeizes the oxygen of the water; hydrogen is evolved; and the acid unites with the oxyd forming the ſalt in queſtion. When the product obtained by this means is more than the water can diſſolve, it aſſumes the form of green cryſtals, which, when ſeparated, are the ſame with thoſe known in commerce and the arts by the names of *green vitriol* and *copperas*.

In the action of iron upon the concentrated ſulphuric acid, it appears anomalous, that the metal ſhould not be oxydized with more facility by this acid, when water is ſo rapidly decompoſed, the elements of which have ſo ſtrong an attraction for each other. It may appear equally ſtrange that the water is not decompoſed when the acid is not preſent. When it is recollected, however, that the oxyd of iron is not ſoluble in water, nor ſulphat of iron in the acid, it will appear very clear that the two ſubſtances are both eſſential to the effect; the acid promoting the decompoſition of the water by taking away the oxyd, and the water taking up the ſalt, which would be equally obſtructive to the proceſs.

This ſalt is not commonly obtained by the above proceſs. The ſulphuret of iron, above deſcribed, already conſiſts of two of its elements, namely, ſulphur and iron; the oxygen and water of cryſtallization being alone wanting to complete the ſalt under inquiry. For this purpoſe, the natural combination of it, or pyrites, is firſt roaſted, and then expoſed in large heaps under ſheds. Theſe heaps are frequently moiſtened with water, by which, together with the preſence of the air, the iron and the ſulphur become oxygenated, and cryſtals of the ſulphat begin to form. The water, which is thrown on from time to time, diſſolves the ſalt, and runs into large reſervoirs, which are alſo under ſheds, to prevent the rain falling into them. This ſolution, however, does not contain the ſalt in a fit ſtate for cryſtallization, being too highly charged with oxygen. The liquor is transferred into large boilers, and pieces of old iron put into it, which, by taking up the exceſs of oxygen, change the ſolution from a red to a green colour. When the evaporation has gone on to a certain point, the ſalt cryſtallizes, and the green cryſtals being ſeparated, are fit for ſale.

When the cryſtals are obtained from a clear ſolution, and are well defined, exhibiting tranſparent rhomboidal priſms, the ſpecific gravity of which is 1.8, the ſalt may be deemed in a ſtate of purity. It diſſolves in $\frac{3}{4}$ths its weight of boiling water, and twice its weight of water at 60°. When kept dry, it is not liable to change in the air; but if moiſtened it becomes covered with red ſpots by the abſorption of oxygen, and if it be diſſolved in water, it returns to the ſtate in which it exiſted before boiling with the metallic iron. When the cryſtals are heated, the ſalt at firſt fuſes, then aſſumes the form of white powder, by loſing its water of cryſtallization. At a red heat the acid begins to fly off; and ultimately a fine red oxyd is left behind. It is in this way the *crocus* of commerce is prepared.

According to the analyſis of Bergmann, this ſalt is compoſed of

Acid	- -	39
Protoxyd of iron	-	23
Water	- -	38
		100

According to Kirwan:

Acid	- -	26
Oxyd	- -	28
Water	- -	46
		100

It is decompoſed by the alkalies and alkaline earths; and by all the ſalts forming inſoluble compounds with ſulphuric acid.

Oxy-ſulphat of Iron.—This ſalt conſiſts of the ſulphuric acid united to the peroxyd of iron. Its ſolution in water is of a deep reddiſh-brown colour. It is inſuſceptible of cryſtallization. Hence, the green cryſtals ſeparated in making copperas are perfectly diſtinct in their nature from the ſalt which is left in the remaining liquid. When the ſulphat is expoſed in a ſtate of ſolution for a length of time, it aſſumes a red colour, and is converted into this ſalt; ſo that we never find the common ſulphat in mineral waters, but the oxy-ſulphat. This change may be more ſpeedily brought about by heating it with nitric acid. A quantity of nitrous gas is evolved, and, according to Mr. Davy, ammonia alſo; the former from the decompoſition of the acid, the latter from the decompoſition of both the acid and the water. The fluid gradually aſſumes a deep brown colour. It has a ſtrong aſtringent taſte, much reſembling the juice of ſloes. When this ſalt is formed without the addition of water, it is exceedingly heavy, and concentrated, and of a deep brown tint, approaching to blackneſs. If concentrated ſulphuric acid be poured into it ſuddenly, it loſes its brown colour, and becomes of a clear white, having the conſiſtence of thick cream. It is ſo ſoluble in water, that when evaporated ſlowly, inſtead of cryſtallizing, it aſſumes the form of ſyrup. If too much heat be applied, however, the oxyd either precipitates, or it aſſumes the form of a ſub-ſalt, and becomes inſoluble.

Since the oxy-ſulphat differs from the ſulphat in the proportion of oxygen only, ſeveral ſubſtances reconvert it into that ſalt, by abſtracting the exceſs of oxygen. If it be kept, for inſtance, for ſome time in a cloſe-ſtopped bottle with iron-filings, the metal becomes oxydized, and the whole is changed to the ſimple ſulphat.

Gay-Luſſac has lately ſhewn that the quantity of acid in any metallic ſalt is in proportion to the quantity of oxygen in the metal. (Memoires d'Arcueil, t. ii. p. 159.) Hence no additional acid is required in converting this ſalt into the ſulphat.

Tin, and ſeveral other metals, produce the ſame effect. The exceſs of oxygen may inſtantly be taken away by paſſing ſulphuretted hydrogen gas through the oxy-ſulphat. This gas reduces the oxyd exactly to a *minimum* of oxydation, to the ſtate of protoxyd; and hence the reaſon why this gas does not precipitate iron from its ſolutions.

The oxy-ſulphat may be eaſily ſeparated from the ſulphat; the former being ſoluble in alcohol, which the latter is not.

From the method required to form this oxy-ſalt, it will appear that there are ſeveral ſubſtances which may be employed to give their oxygen to the ſulphat of iron. Of theſe are the nitric and oxy-muriatic acids. And by pouring a ſolution of gold into a ſolution of this ſulphat, the oxy-ſulphat is produced, and the gold becomes metallic.

Dr. Thomſon enumerates ſeveral *triple* ſalts, formed by the ſulphuric acid with iron and other metals.

1. Sulphat of iron and copper.
2. Sulphat of iron and zinc.
3. Sulphat of iron and nickel.

The former of theſe ſometimes exiſts in the blue vitriol of commerce, which is a very great evil to colour-makers. The iron precipitates with the copper, and deſtroys the beauty of the latter. In order to aſcertain whether iron be preſent in blue vitriol, diſſolve a ſmall quantity in a wine-glaſs, and add aqua ammonia till it ſmells ſtrong of the latter. The oxyd of copper will be diſſolved, and the oxyd of iron left at the bottom. By ſtanding for ſome time, the precipitate becomes yellow and very conſpicuous. It is even ſaid that ſome of theſe ſalts have triple baſes. The two hitherto obſerved are as follows:

1. Sulphat of iron, zinc, and nickel.
2. Sulphat of iron, copper, and nickel.

Sulphite of Iron.—Berthollet has given us an account of a compound of iron with the ſulphurous acid. When iron is expoſed to the action of this acid, it becomes ſpeedily oxydized; but what is ſingular, not at the expence of the water, as is the caſe with the ſulphuric acid; but it appears that the acid is decompoſed, the oxygen uniting with the iron, while the ſulphur combines with the ſalt. Hence this ſulphat of iron is always contaminated with ſulphur. The ſulphurous acid has a leſs affinity for iron than the ſulphuric; and if the latter be added to the ſulphat, its acid is diſengaged in the form of gas.

Nitrat of Iron.—The nitric acid has very violent action upon iron, and an abundance of the red fumes of nitric oxyd are diſengaged. The ſame thing in ſome meaſure takes place with this acid, as has been remarked with regard to the ſulphuric. If it be more than a certain ſtrength the action is feeble, until a certain portion of water is added. The ſame explanation will anſwer in both inſtances. The nitric acid does not diſſolve the nitrat at firſt formed, the preſence of which interrupts the future progreſs of the operation. When the ſolution is made with much water the iron is oxydized to a *minimum*, and the ſalt formed is the proper nitrat. It is of a pale green colour. The veſſel in which this ſolution is made ſhould be kept in water as cold as poſſible, elſe it will abſorb too much oxygen, and paſs to the oxy-nitrat.

Oxy-nitrat of Iron.—When iron is acted upon by the leſs diluted acid, and with heat, the ſalt formed is the oxy-nitrat. The ſolution is of a deep brown, reſembling the oxy-ſulphat. It has a ſtrong aſtringent taſte, and turns vegetable blues red. When the ſolution is boiled the oxyd is partially precipitated; nor will it afterwards diſſolve in the nitric acid. This has furniſhed one means of ſeparating iron from other ſubſtances in the analyſis of minerals.

We are indebted to Vauquelin for a method of obtaining this ſalt in a cryſtallized ſtate. The method he recommends, is to keep the black oxyd of iron and ſtrong nitric acid together for a length of time, till the cryſtals appear. They have an acid taſte, and are deliqueſcent. The form of them is that of a four-ſided priſm.

The alkalis precipitate the oxyd of iron from this ſalt of a fine yellow colour, and yield a product which is valuable to painters.

Muriat of Iron.—The muriatic acid, like the ſulphuric and nitric, acts feebly upon iron, except it be diluted to a certain extent with water. It differs from the latter, and agrees with the former, in not being decompoſed; but merely takes up the oxyd formed by the oxygen of the water, the hydrogen being given out in the ſtate of gas. The ſolution is of a green colour; and, on evaporation, it affords cryſtals preſenting the ſame appearance. Mr. Davy has given us ſeveral uſeful facts relative to this ſalt. It was employed by him to great advantage in making ſome eudiometrical experiments. He found that a ſolution of it abſorbs a large quantity of the nitric oxyd gas, which, in this ſituation, is better fitted for abſorbing oxygen than by mixing the two gaſes together. By abſorbing this gas it aſſumes a brown colour, and acquires an aſtringent taſte. When the compound is heated, it appears that the gas is decompoſed as well as a portion of water; ſince the iron becomes more highly oxydized, and ammonia is formed. Mr. Davy recommends an infallible method of forming this ſalt, by adding muriatic acid to ſulphuret of iron. The ſulphuretted hydrogen prevents the muriat from becoming oxy-muriat, which has not the property of abſorbing the nitric oxyd. Muriat of iron is very ſoluble in water and in alcohol. It is decompoſed by the alkalis and alkaline earths, and all ſalts, the baſes of which form inſoluble compounds with muriatic acid; ſuch as ſilver and mercury.

Oxy-muriat of Iron.—The muriat of iron, like the ſulphat and nitrat, is converted into the oxy-muriat by the oxyd of iron paſſing from the ſtate of prot-oxyd to that of per-oxyd. It ſlowly undergoes this change by expoſure to the air; and rapidly, by the agency of thoſe bodies which afford oxygen with greater facility, as the nitric and oxy-muriatic acids. The ſolution is of a deep brown, but does not afford cryſtals by evaporation. It has a powerful, aſtringent taſte, and a peculiar odour. When this ſalt is diſtilled it affords oxy-muriatic acid, leaving in the retort the prot-oxyd of iron.

If the heat be applied rapidly, the ſalt ſublimes; not in the ſtate of oxy-muriat, but of muriat of iron.

There is alſo a triple ſalt formed by the muriatic acid with iron and ammonia. This may be prepared by adding iron-filings to muriat of ammonia. It may either be obtained in cryſtals by evaporation, or it may be ſublimed. In the latter ſtate it is known in medicine by the name of *Flores Martis.*

Phoſphat of Iron.—The phoſphoric acid has little action upon iron; but the acid unites with the prot-oxyd, and forms this compound.

It is prepared by adding a ſolution of ſulphat of iron to a fluid mixture of phoſphat of potaſh. The ſalt precipitates in the form of a blue powder, which is inſoluble in water, and does not loſe its colour by expoſure to the air.

The ſubſtance known by the name of native Pruſſian blue, is a phoſphat of iron; but, what is remarkable, it has little colour when dug out of the earth, becoming deeper on expoſure to the atmoſphere. A cryſtallized ſpecimen, lately brought from Brazil, has been analyſed by Vauquelin, and is compoſed of

Acid	21
Protoxyd	45
Water	34
	100

Oxy-phoſphat of Iron.—This ſalt is formed by taking advantage of ſome oxy-ſalt of iron and phoſphat that is ſoluble; as, for inſtance, by adding together the oxy-ſulphat, or oxy-muriat of iron, and the phoſphat of ſoda or of potaſh, a white powder will be precipitated, which is the oxy-phoſphat of iron.

This ſalt is inſoluble in water, but diſſolves in the muriatic or ſulphuric acids; from which it may be precipitated, unchanged, by pure ammonia.

Sub-oxy-phoſphat of Iron.—The ſalt above deſcribed is not decompoſed by the alkalis like the metallic ſalts in general. The alkali combines with a portion of the acid only, leaving the ſalt with an exceſs of baſe, which is the ſub-oxy-phoſphat of iron. This ſub-oxy-phoſphat does not diſſolve in water, or ſcarcely in acid: but it has the ſingular property of diſſolving in albumen, or the white of eggs: and if an alkali be preſent, which is the caſe with the albumen in the ſerum of blood, it aſſumes a reddiſh-brown colour, and is ſuppoſed, therefore, to be the principal colouring matter of the red blood of animals.

Fluat of Iron.—The liquid fluoric acid attacks iron, or rather takes its oxyd, which is formed by the oxygen of the water, while hydrogen gas is evolved. It has no ſtriking properties, or any which it may be important to deſcribe.

Borat of Iron.—This ſalt, being inſoluble in water, is obtained by mixing ſolutions of borat of ſoda and ſulphat of iron together. It appears in the form of a yellowiſh powder, and melts into glaſs before the blow-pipe.

If the oxy-ſulphat of iron be employed, an oxy-borat will be obtained.

Carbonat of Iron.—When iron-filings are mixed with the liquid carbonic acid, and ſuffered to remain for ſome time, the water will acquire a perceptible taſte of iron. If it be expoſed to the air, a precipitation takes place, either from the gas flying off, or from the ſalt aſſuming the ſtate of ſub-carbonat. The precipitate is of a yellow colour. This ſalt is frequently found in mineral waters, to which it gives a peculiar odour. The water, by ſtanding a little while, is not ſenſible to any of the teſts of iron; but a yellow precipitate is found at the bottom of the veſſel.

When a ſolution of neutral carbonat of potaſh is added to a ſolution of ſulphat of iron, a large quantity of iron is diſſolved by the carbonic acid, giving to the fluid a ſtrong inky taſte.

This ſalt is alſo found native in the ſolid form, of which we have already ſpoken in the mineralogical part of this article.

The common ruſt of iron, formed by expoſing iron to the air, may be proved to be a carbonat of this metal by its effervesſcence with acids. It is, no doubt, from the ſolubility of this ſalt, that iron becomes ſo periſhable by expoſure to the weather.

The ſub-carbonat of this ſpecies, according to Bergmann, is compoſed of

24	acid
76	oxyd
100	

It appears from ſome experiments of Bucholz, that the native carbonat, by heating red-hot, becomes magnetic.

Acetat of Iron.—The acetic acid, when of moderate ſtrength, added to iron-filings, cauſes the iron to be oxydated by the decompoſition of the water, while the hydrogen is ſet at liberty. The ſolution has a ſweetiſh, though inky taſte, and emits the odour of vinegar. The beſt way of forming this ſalt is by mixing acetat of lead and ſulphat of iron together. The ſulphat of lead becomes inſoluble, and the acetat of iron remains in the liquid. Mr. Davy obtained this ſalt by digeſting the ſulphuret of iron with acetic acid. It afforded to him cryſtals in ſmall priſms.

Oxy-acetat of Iron.—If the oxy-ſulphat of iron be uſed inſtead of the ſulphat with the acetat of lead, the ſulphat of lead is precipitated, and an oxy-acetat is held in ſolution of a beautiful reddiſh-brown colour. This ſalt does not afford cryſtals. It has the ſmell of vinegar; and, when in ſolution, affords an excellent teſt for arſenic. The arſenic forms an inſoluble compound with the iron, of a brilliant orange tint. The pyrolignic acid, which is an impure acetic acid, unites with iron, and yields a very cheap acetat of iron, which is uſed by dyers and calico printers as a mordant.

Succinat of Iron.—When the ſolutions of ſuccinat of potaſh or ſoda, and ſulphat of iron are mixed together, a browniſh-red inſoluble precipitate is formed, which is the ſuccinat of iron. The ſoluble ſuccinat may hence be employed to ſeparate iron from other ſubſtances.

It is compoſed of

Acid and water	61.5
Oxyd - -	38.5
	100

The *oxalat, tartarat, citrat, malat, benzoat,* and *ſuberat of iron,* are but little known. They are all, however, ſoluble in water.

Gallat of Iron.—When the gallic acid is added to any ſolution of iron, the oxyd being at a *minimum* of oxydation, a fine purple precipitate will be produced. If the acid be entirely freed from tan, the purple colour is much more conſpicuous. The pure gallic acid, therefore, is much better as a teſt for iron, than the mere infuſion of galls.

The tan may be ſeparated from this acid by means of gelatine, which does not precipitate the gallic acid. By this treatment a ſolution may be obtained colourleſs and limpid.

If the gallic acid be added to a ſalt of iron, in which the oxygen is at a *maximum,* the precipitate is a very complete black; but the oxyd ſoon ſeparates, and falls to the bottom in the form of a red powder. This property renders theſe ſalts of iron unfit for making writing ink. When the oxyd is in the ſtate of prot-oxyd, the combination is permanent; and although it is not ſo black when firſt uſed, it ſoon becomes dark by expoſure to the air. We may hence learn, that while ink is in uſe, it ſhould not be kept expoſed to air; ſince it paſſes to the ſtate of oxy-gallat, and the oxyd will fall down.

Pruſſiat of Iron.—When the triple pruſſiat of potaſh and iron is poured into a ſolution of the latter ſubſtance, the oxyd being at a *minimum* of oxydation, a white powder is precipitated, which is the pruſſiat of iron. If this powder be expoſed to the air, it changes to a blue; and in this ſtate is called the oxy-pruſſiat of iron.

Oxy-pruſſiat of Iron.—This ſalt is formed by the ſame ſoluble pruſſiat being added to the oxy-ſulphat of iron, and conſtitutes the beautiful blue pigment, known by the name of *Pruſſian blue.* It is generally, however, adulterated with alumine. See PRUSSIAN BLUE and PRUSSIC ACID.

Arſeniat of Iron.—The native arſeniat has been already deſcribed in the mineralogical part of this article. Arſeniat of potaſh, or ammonia, being added to the ſulphat of iron, an inſoluble powder precipitates, which is the artificial arſeniat of iron.

Oxy-arſeniat of Iron.—The arſeniat of iron, in common with all the other ſalts of this metal, combines with an extra doſe of oxygen, conſtituting the oxy-arſeniat. The precipitate formed by the arſenic acid and the oxy-acetat of iron is of a blueiſh-white colour.

The oxy-arſeniat of iron, from the analyſis of Chenevix, is compoſed of

Acid	42.4
Oxyd	37.2
Water	20.4
	100

Arſenite of Iron.—The arſenious acid, or the common white arſenic of commerce, forms with iron peculiar compounds, which have been but little examined. It does not take the oxyd of iron from the ſulphat, but decompoſes the acetat, forming with the protoxyd a ſubſtance of a greeniſh-yellow colour; the precipitate from the oxy-acetat being of a bright orange. If either of the acetats contain the leaſt portion of the ſulphat of iron, it prevents the precipitation of the arſenite.

Chromat of Iron.—See CHROME.

Moſt of the other acids combine with iron; but they form compounds which are but little known. Certain alkaline ſalts act upon iron, and produce triple compounds, which have not received a particular examination. When the nitrat of potaſh is fuſed in contact with that metal, the acid is decompoſed, and the iron oxydized to a *maximum.* This melted maſs, after the acid is completely diſſipated, is of a red colour. If, before it becomes deliqueſcent, which takes place from the preſence of the alkali, it be thrown into water, the alkali diſſolves a quantity of iron, forming a ſolution of a deep ſplendid purple tint. The colour remains permanent for ſome time, if the air be excluded; but, if expoſed in an open veſſel, it changes quickly to a green, and the oxyd ultimately precipitates, leaving the liquid clear and colourleſs. The precipitated oxyd is of a deep red colour.

Deſcription of Plates.

Plate I. *fig.* 1, a plan of an iron forge; *fig.* 2, an elevation of the ſame. In *fig.* 1. A is a water-wheel, which gives motion to the ſtamping hammer E; G, the mill-dam; H, the tail water courſe; I is a ſmall water-wheel, to give motion to the blowing machinery; L, *fig.* 1, is another water-wheel, which works the hammer *o*, for drawing the balls, &c. into bars; K is the mill-dam for ſupplying all the wheels.

Q, in *fig.* 1, is a refinery, technically called a *finery*; in *fig.* 2. is the elevation. It is blown by the double blowing cylinders, *e*, *e*. R, the *chafery* for heating the maſſes of iron a ſecond time after hammering; S, S, plans of balling furnaces, and ſimilar to the puddling furnace.

Plate II. *fig.* 1. is a front view of the finery, as ſeen *fig.* 2. *Plate* I.; *fig.* 2. being a ſide view. K, the hearth on which the pig-iron and charcoal is placed; G H, the chimney; *f*, the air-pipe; *g*, a cock to regulate the blaſt; *h*, a leathern pipe connecting the main-pipe with the noſe-pipe; *i*, *fig.* 3, an enlarged view of the tuyere-iron, into which the noſe-pipe *i* is inſerted, and which enters the hearth at *a*, *fig.* 1.; *m* and *n* are two iron pipes, terminating in, and forming a part of the tuyere-iron. The pipe *m* communicates with a ciſtern of water, which conveys a ſtream of cold water, for the purpoſe of keeping the tuyere-iron cool, and which is diſcharged at *n*, into the ciſtern *o*, *fig.* 4, where the whole of this apparatus is ſeen. The furnace called the *run-out furnace* is very ſimilar to the finery. The hearth of the finery is ſurrounded with caſt-metal plates, having a cavity under the bottom plate, to throw water from time to time to keep the bottom plate cool. The *run-out furnace* differs from this, in being ſurrounded on three ſides with water. This furnace, and its uſe, has already been deſcribed. The chafery is alſo ſimilar to the finery, except in the hearth being more like the ſmith's forge.

Fig. 5. exhibits tongs for taking the balls from the furnace to the hammer; and *fig.* 7. an iron ladle, employed to throw water into the puddling furnace, to oxydate the iron.

Fig. 8. the face of the ſtamping hammer, which is made to be taken out occaſionally.

Fig. 9. the face of the hammer employed for drawing out the bars: *b* is the part uſed to extend the bars in length with more expedition; the part *a* being employed for ſmoothening or finiſhing the bar.

Figs. 10. and 11. are different views of the balling furnace: *a* is the fire-grate; *b*, the hole where the fuel is admitted; *d d*, the roof made of fire-brick; *e*, the door through which the balls are admitted; and *b b*, the hearth on which the balls are laid to be heated, by the flame which is carried by the draught of the chimney G. This furnace is bound on all ſides by bars of iron, ſecured by bolts.

The puddling furnace is ſo nearly ſimilar to this, as not to require a ſeparate drawing. The hearth is more concave oppoſite the door, for the purpoſe of containing the metal which is liquid, previous to its aſſuming its malleable ſtate. The door of this furnace, for heating the balls, conſiſts of a frame of wrought iron, containing fire-bricks, to prevent the eſcape of heat. It ſhuts and opens upon the hole, by being attached to the end of a lever; its weight being counterpoiſed at the other end. See *fig.* 1. *Plate* IV. where R is the lever; *b*, the door; and *f*, the part by which it is raiſed.

The door of the puddling furnace conſiſts of a ſolid piece of caſt-iron, about 3 inches thick, having a ſmall hole through it, for the purpoſe of inſpecting the proceſs, and introducing the puddling inſtruments.

Plate III. *figs.* 1. and 7. are views of the reverberatory furnace, uſed by the caſt-iron founders, for melting large quantities of metal at once. This furnace, like the laſt, is heated with flame from its fire-place *a*, the fuel being introduced at B; *c d* is a ſloping hearth, on which the pigs or other pieces of metal are laid; *b*, the door where it is introduced; and *g*, the chimney. The melted metal runs down to the part *o*, where it is accumulated, and is let out at *f*; or a door may be opened at *e* above, and the melted metal carried out in ladles, to be poured into the moulds.

Fig. 2. is a ſection of a cupola, in which *a* is the interior of the furnace containing the metal and cokes; *e*, the tap hole; *b*, the noſe-pipe; *d*, a leathern pipe connecting the air-pipe, which comes from the blowing cylinder, with the ſame; *e*, a ſtop-cock to regulate or turn off the blaſt.

It generally conſiſts of four plates of caſt-iron, firmly bolted together; the interior being lined with fire-brick. This furnace is generally employed for the beſt kind of work, and will melt many charges in a day, according to the nature of the metal expoſed in it.

Plate IV. *figs.* 1. and 2. are two views of forge-hammer machinery, erected by the celebrated Smeaton. A is the water-wheel; H, a fly-wheel; D, wheel-work to open the ſhuttle by a little at once, for the purpoſe of adjuſting the quantity of water; F, a cog-wheel to give motion to the wheel G; at the other end, I, are a number of cogs, which lift the hammer K, *fig.* 2, by paſſing under its ſhaft, or helve, as it is ſometimes termed; L, a large beam of wood inſerted into the poſt M, and paſſing horizontally over the hammer. Into the poſts, M and N, is inſerted a piece of aſh-timber *o*, againſt which the hammer K ſtrikes in its aſcent, and by its elaſticity re-acts upon the hammer, and gives it a greater deſcending velocity than would be produced by gravity alone. Q is a number of heavy pieces of metal laid upon the beam L, to increaſe its *vis inertiæ*, and will, in conſequence, receive leſs motion from the hammer. (See Mill-Work and Water-Wheel.) The hammer here deſcribed has been much improved, ſo far as regards the ſpring at *o*.

That already mentioned in the plate is much preferred. The whole of it is made of caſt-iron, and its weight is about 35 *cwt.* It acts ſimply by its gravity; its extra force, therefore, over the common one, conſiſts in its greater quantity of matter. It is made exceedingly maſſive near the centre of motion, by which means its centre of oſcillation is thrown nearer to that point, and it conſequently deſcends with greater velocity. Although this is an advantage with reſpect to the number of ſtrokes in a given time, it is a diſadvantage in another way; ſince the centre of oſcillation is alſo the centre of percuſſion, or the point where the greateſt ſtroke is made. Could the velocity be obtained without this evil, the advantage would be material. See Tilting-Mill.

Iron, in the *Materia Medica*, is ſaid to have greater virtues than any of the other metals, which is not to be wondered at, as being the only one that is in a manner ſoluble in the human body. All the other metals, whether hard or ſoft, poiſonous or ſalutary, nay even fluid mercury itſelf, ſwallowed in their crude ſtate, paſs out of the body again unaltered; but this is not the caſe with iron, its crude filings are often taken as a medicine, and are always ſo much acted upon by their juices, as to produce conſiderable effects. It is ſo eaſily wrought upon out of the body alſo by fire, and by different menſtruums, that it becomes an aperient or aſtringent, as it is differently treated; and is, under proper management, greatly ſuperior to all other medicines in chronic caſes.

Iron or ſteel, that is, the *ferrum* or *chalybs*, may be employed indifferently, as Cullen ſuggeſts, in the preparation of the rubigo; but he thinks that, upon the whole, the preference is due to the iron in its ſoft malleable ſtate, or in that which is called "forged iron." As iron, ſays this medical writer, like all other metals, in its ſolid and entire ſtate, is not active with regard to our bodies, without being corroded or diſſolved by ſaline matters, he is of opinion, that it is rendered active only by being combined with acids. It has indeed been common to give the entire metal, brought by filing into a fine powder, and with very good effects, as a medicine. But this he does not conſider as an exception to his general rule; becauſe he is perſuaded that there is conſtantly preſent in the human ſtomach a quantity of acid capable of diſſolving iron; and as a proof of it he alleges that he never knew iron given in its metallic or ſlightly corroded ſtate, without producing a blackneſs in the ſtools, which affords a preſumption of a previous ſolution of the iron in acids. As this combination with acids is neceſſary, phyſicians and chemiſts have diverſified this combination in a variety of ways; Dr. Cullen obſerves, that he has not known a preparation of iron for the purpoſe of medicine, that has not been prepared by a combination with acids, or by bringing the iron into a ſtate that rendered it readily ſoluble by the acid of the ſtomach, and Dr. Lewis very properly remarks, that Pruſſian blue, though truly containing a quantity of iron, as it is not ſoluble in any acid, is the leaſt promiſing of all the medicinal preparations.

Its virtues internally were not unknown to the ancients; Dioſcorides attributes both an aſtringency and aperiency to it, and preſcribes it in hæmorrhages. He alſo recommends its ruſt, or *crocus martis*, in ſuppreſſions of the menſes;

though he, on the other hand, preſcribes wine or water, in which red-hot iron has been quenched, as an aſtringent in dyſenteries, diarrhœas, and weakneſſes of the ſtomach.

Iron combined with acids becomes an aſtringent ſubſtance; and hence its great medicinal virtue is cauſed by its tonic and ſtrengthening qualities; for by increaſing the tone of the veſſels, it increaſes their vigour and activity. It produces a ſlight and gentle irritation of the fibres, the effect of which is to conſtringe the ſenſible organic parts upon which it acts, and to increaſe their force and elaſticity. Iron particularly acts upon the fibres, and the veſſels of the ſtomach and inteſtines; hence it produces excellent effects in all diſeaſes which proceed from laxity and inactivity of the digeſtive organs. Such are crudities, bad digeſtion, accompanied with diarrhœa, flatulencies, flatulent colics, &c. &c. in diſeaſes which proceed from the former, as many hyſterical, hypochondriacal, melancholic affections, intermittent fevers, tertians and quartans, &c. In thoſe caſes iron quickens the circulation and raiſes the pulſe; renders the blood more florid, and as it were expands and rarefies the juices, promoting, when they are deficient, and reſtraining, when immoderate, the ſecretions that are made from the blood, as perſpiration, urine, and the uterine purgations. By the ſame corroborating power, which renders it ſerviceable in promoting deficient, and reſtraining redundant diſcharges, where the ſuppreſſion or flux ariſes from debility and relaxation, it increaſes, on the contrary, fluxes, and confirms obſtructions, when they proceed from tenſion, rigidity, or ſpaſmodic ſtrictures of the veſſels. Where either the circulation is quick, or the habit plethoric, by increaſing the velocity of the blood, and the plethoric ſymptoms, it produces heavineſs, dulneſs, vague heats and fluſhings, or kindles more dangerous fevers or inflammations, or burſts ſome of the over-diſtended ſmall veſſels. In ſome conſtitutions, where iron is proper and ſalutary, particularly in hyſterical and hypochondriacal caſes, and where the ſtomach is very weak, it is apt at firſt to occaſion great ſickneſs and perturbation: to remedy theſe inconveniences, Sydenham adviſes, to begin with very ſmall doſes, and to adminiſter it for a while at bed-time, in conjunction with a ſlight opiate. In other circumſtances, it is commonly taken in the morning and afternoon, and moderate exerciſe uſed to promote its action. In all caſes the doſe ſhould be ſmall and repeated; a grain, or half a grain of the metal diſſolved, or in a ſoluble ſtate, is generally a ſufficient doſe. Its effects are known by nidorous eructations, and by the alvine fæces being tinged of a black colour.

Stahl, and ſeveral other modern chemiſts and phyſicians, acknowledge only the tonic and ſtrengthening qualities of iron. The caſes in which iron has produced a reſolving and aperient effect are thoſe, in which the obſtructions, and the defect of ſecretions and excretions, have proceeded from weakneſs and relaxation of the fibres and of the veſſels, rather than from a craſſitude of humours, as in the chloroſis, in ſome kinds of jaundice, and other diſeaſes of the ſame ſort.

The ſame preparation, as Dr. Lewis has judiciouſly obſerved, may ſometimes exert an aperient, and ſometimes an aſtringent, power, according to the ſtate of the body to which they are applied. *E. g.* If a retention of menſes depends upon a weakneſs in the veſſels of the uterus, chalybeate medicines, by invigorating the force of the veſſels, may cure the diſeaſe, and may thereby appear to be aperient; and, on the contrary, in a menorrhagia, when the diſeaſe depends upon a laxity of the extreme veſſels of the uterus, iron exhibited, by reſtoring the tone of theſe veſſels, may ſhew an aſtringent operation. However, it is probable, that in the caſes of ſuppreſſion depending upon a conſtriction of the extremities of the veſſels of the uterus, the ſame tonic powers may not be ſo properly employed. By conſiderations of this kind, the inutility or propriety of the medicinal preparations of iron may be determined. In all caſes of active hemorrhagy they muſt be hurtful; and in caſes of hemorrhagy from external violence, Dr. Cullen would judge them to be uſeleſs, if not hurtful. In caſes of a general flaccidity, as it is frequently marked under the title of "Cachexy," and in all caſes of evacuations from laxity, whether ſanguine or ſerous, they are likely to be the moſt effectual remedies. The good effects of the preparations of iron, as Dr. Cullen apprehends, have been often miſſed by their being given in too ſmall doſes. The ſaline preparations, in large doſes, are ready to irritate the ſtomach; and for this reaſon, and ſome others, it muſt be always proper to begin with ſmall doſes, and to increaſe them by degrees; but he has often found, that no great benefit is to be obtained but when large quantities, either by the ſize of the doſes, or by the long continuance of them, have been thrown in. He ſays, that he has found the ſimple ruſt as effectual as any other preparation, and the ſtomach has borne it better than any other. He begins with a doſe of five grains, but gradually increaſes it to what the ſtomach eaſily bears. Some are ſaid to have given it to the quantity of ſix drams in one day; but he has hardly found any ſtomach that would bear the third part of that quantity without much ſickneſs. He thinks that the ſtomach bears it better by joining with it ſome aromatic.

The preparations of iron that have been in more frequent uſe, and ſome of which are at preſent continued under different names, are, 1. The crude filings reduced to an impalpable powder; this is an excellent form for adminiſtering iron in female diſorders, in which the body is weak, languid, and full of acidities; the doſe of the filings is from two or three grains to a ſcruple or more. 2. "Mars ſaccharatus," which is the filings candied with ſugar, by diſſolving two parts of fine ſugar in water, and boiling it down to a candy conſiſtence, and adding, by little and little, one part of the cleanſed filings in a kettle over a gentle fire; the veſſel being continually ſhaken, that the filings may be cruſted over with the ſugar. In order to prevent the mixture from running into lumps, a little ſtarch is previouſly mixed with the ſugar, in the proportion of a dram to a pound. 3. "Limatura Martis præparata," or "Chalybis rubigo præparata," is formed by moiſtening the filings with vinegar or water, and expoſing them to a moiſt air, or occaſionally moiſtening them afreſh, which ſoon change in great part into ruſt; this ruſt may be ſeparated from the uncorroded part, by grinding and waſhing over the fine powder with water. This is given in the ſame doſe as the crude filings.

This preparation, which was denominated "chalybis rubigo præparata" in the London Pharmacopeia of 1745, and "ferri rubigo" in that of 1787, is now called "ferri carbonas," or carbonate of iron. It is formed of ſulphate of iron, eight ounces; ſub-carbonate of ſoda, ten ounces; and a gallon of boiling water. Diſſolve the ſulphate of iron and ſub-carbonate of ſoda ſeparately, each in four pints of water; then mix the ſolutions together, and ſet by the mixture, that the precipitated powder may ſubſide; having poured off the ſupernatant liquor, waſh the carbonate of iron with hot water, and dry it upon bibulous paper in a gentle heat.

There are two oxyds of iron, both of which are combined with acids, and form different modifications of the ſame ſalt, a diſtinction that ought to be particularly regarded in medicine; they have been named, from their colour, black and red oxyds; the former, which is black, or (if formed as in the preſent inſtance, by precipitation from water) greeniſh, conſiſts of iron 73, and oxygen 27, according to Lavoiſier. It may be formed in various ways: as by expoſure of a paſte of iron-filings and water to the air; by heating together one part of red oxyd of iron, and two parts of iron-filings; and by adding a ſolution of alkali to one of green ſulphate of iron, and drying the precipitate quickly without expoſure to air; and it is kept as a ſeparate article in the Edinburgh Pharmacopeia, under the name of "Ferri oxydum nigrum purificatum." The latter, or red oxyd, conſiſts, according to Prouſt, of iron 52, oxygen 48, and in its relation to black oxyd is compoſed of 66.5 of that oxyd, and 33.5 of additional oxygen. Some chemiſts have ſuppoſed the exiſtence of other gradations of combination of iron and oxygen, but the above are all that are generally admitted, or that require particular notice; this latter is alſo kept in the Edinb. Pharmac. under the name of "oxydum ferri rubrum." Salts containing the black oxyd, on expoſure to air, paſs to the ſtate of red oxyd, by attracting oxygen from it, and in the proceſs of drying, the ſame change happens here to the oxyd in the ſub-carbonate, which, at the time of its firſt precipitation, is a black oxyd. The ſame ſubſtance, more imperfectly prepared, conſtituted the ruſt of iron (*ferri rubigo*) of the former Pharmacopeia, for which, in all the proceſſes into which it entered, this precipitate is now ſubſtituted. The red oxyd of the Edinburgh college is the old "Colcothar vitrioli," and formed by expoſure of common ſulphate of iron to a ſtrong heat, ſufficient to drive over its ſulphuric acid, when the red oxyd remains behind, as in the proceſs which was formerly in uſe for obtaining that acid. Sub-carbonate of ſoda is preferred for the precipitation to that of potaſh, on account of the greater ſolubility of the ſulphate of the former than of the latter alkali, and the conſequent facility with which it may be waſhed away. The ſalt is a ſub-carbonate, but as only one of the compounds is kept, the relation is not expreſſed. The doſe of the "ferri carbonas" is from two to ten grains.

4 "Mars ſulphuratus," prepared by mixing iron-filings with twice their weight of flower of brimſtone, and as much water as will make them into a paſte, which in a few hours ſwell up, and is then pulverized, and put into a heated crucible to deflagrate, and kept conſtantly ſtirring with an iron ſpatula, till it falls into a deep black powder: this powder urged longer in the fire, becomes red, and is called, 5. "Crocus martis aperiens et aſtringens." 6. The ſalt or vitriol of iron, "ferrum vitriolatum," called "Sal martis." This is now diſuſed. See Crocus *Martis*.

This is the "ferri ſulphas," ſulphate of iron, of the Lond. Pharm. of 1809; and is compoſed of iron and ſulphuric acid, of each by weight eight ounces, and four pints of water. The ſulphuric acid and water are mixed together in a glaſs veſſel, and the iron is added: then, after the efferveſcence has ceaſed, the ſolution is filtered through paper, and evaporated, ſo that cryſtals may form as it cools. The water is afterwards poured away, and the cryſtals are dried upon bibulous paper. Upon a large ſcale this ſalt is formed from native ſulphuret of iron (*pyrites*) by moiſtening, and expoſing it to the open air. The ſulphate of iron is afterwards diſſolved in water and cryſtallized by evaporation. Sulphuric acid will unite either with the black or red oxyd: the firſt of theſe is the ſalt here intended for internal uſe, and upon this point great ſtreſs ought to be laid; as the laſt is the ſtate in which the ſulphate of trade is uſually found, and which, for medical purpoſes, is a very diſtinct and inferior thing. Its cryſtals are tranſparent rhomboidal priſms, of a light green colour; its taſte is aſtringent and ſtrong, and it reddens vegetable blues. One part is ſoluble in two of cold, and in three-fourths of boiling water. It is inſoluble in alcohol, in which menſtruum the red ſulphate is ſoluble, and this affords a method of aſcertaining the exiſtence of the latter with the former, as alſo of ſeparating it. On expoſure to air it is gradually converted into red ſulphate: it conſiſts, according to Kirwan, of acid 26, iron 28, and water 46, parts. Heat drives off the water of cryſtallization, and the ſalt remains white: if urged farther, it drives over the acid, and leaves firſt a red ſulphate, and at laſt a red oxyd of iron. The doſe of the "ferri ſulphas" is from one to five grains. 7. "Tinctura martis in ſpiritu ſalis," P. L. 1745, "Tinctura ferri muriate," P. L. 1787, or "Tinctura ferri muriati," tincture of muriate of iron, P. L. 1809. This is formed by pouring the muriatic acid, in the proportion of a pint, upon half a pound of carbonate of iron in a glaſs veſſel, and ſhaking it occaſionally for three days: then ſetting it by, that the fæces, if there be any, may ſubſide; pouring off the ſolution, and adding three pints of rectified ſpirit. This ſalt appears to be an oxymuriate of iron, the red oxyd of iron employed becoming, on its combination with the acid, black oxyd, and giving over its ſuperabundant oxygen to the muriatic acid. This appears to be its ſtate, becauſe ſulphuric acid added to it detaches oxymuriatic acid, and heat drives over oxymuriatic acid; and in the latter inſtance, although the red oxyd was uſed for its preparation, the black oxyd remains behind. The ſalt, evaporated to dryneſs, yields an orange-coloured maſs, which is uncryſtallizable, deliqueſces on expoſure to air, and is ſoluble in alcohol. The tincture has a browniſh yellow colour, and very aſtringent taſte. 8. "Flores martiales," P. L. 1745, flowers of iron (ſee Flores), "Ens Veneris," P. L. 1720, "ferrum ammoniacale," P. L. 1787, or "ferrum ammoniatum," ammoniated iron, P. L. 1809, is compoſed by intimately mixing carbonate of iron and muriate of ammonia, of each a pound, and ſubliming by immediate expoſure to a ſtrong fire, and, laſtly, reducing the ſublimed ammoniacal iron to powder. This ſubſtance conſiſts of red muriate of iron, mixed by ſublimation with muriate of ammonia. It is orange-coloured, with a ſmell reſembling ſaffron, is deliqueſcent, and ſoluble in alcohol. The reſidue, which is deliqueſcent, conſiſts alſo of red muriate of iron, and was formerly kept under the name of "lixivium martis." The doſe is from three to fifteen grains. 9. "Tinctura florum martialium," P. L. 1745, "Tinctura martis Mynſichti," P. L. 1720. "Tinctura ferri ammoniacalis," P. L. 1787, or "Tinctura ferri ammoniati," tincture of ammoniated iron, P. L. 1809, is formed by digeſting four ounces of ammoniated iron in a pint of proof ſpirit, and then ſtraining. This is an elegant chalybeate, and may be given in doſes of a tea-ſpoonful. 10. "Ferrum tartarizatum," or tartarized iron, P. L. 1787 and 1809, called alſo "Mars ſolubilis," and "Chalybs tartarizatus," conſiſts of iron, a pound, ſupertartrate of potaſs, powdered, two pounds, and a pint of water. Rub them together, and expoſe them to the air in a broad glaſs veſſel for eight days, then dry the reſidue in a ſand bath, and reduce it to a very fine powder. Add to this powder a pint more of water, and expoſe it for eight days longer; then dry it, and reduce it to a very fine powder. This is a triple ſalt, in which the iron is firſt oxydated by being moiſtened and expoſed to air, and then combines with the ſuperabundant acid of the ſupertartate of potaſs; and it is therefore a tartrate of potaſs and iron. It may be diſſolved in water and cryſtallized. This elegant and uſeful chalybeate may be given either in a ſolid or liquid form, from five grains to a ſcruple. It has been uſually diſtinguiſhed in the ſhops by the name of its inventor, Dr. Willis. 11. "Liquor ferri alkalini," or ſolution of alkaline iron, is compoſed of 2½ drams of iron, two fluid-ounces of nitric acid, ſix fluid-ounces of diſtilled water, and ſix fluid-ounces of the ſolution of ſubcarbonate of potaſs. Having mixed the acid and water, pour them upon the iron, and when the effervеſcence has ceaſed, pour off the clear acid ſolution; add this gradually, and at intervals, to the ſolution of ſubcarbonate of potaſs, occaſionally ſhaking it, until it has aſſumed a deep brown red colour, and no farther effervеſcence takes place. Laſtly, ſet it by for ſix hours, and pour off the clear ſolution. This preparation was firſt deſcribed by Stahl, and called "tinctura martis alkalina," and it is for the firſt time introduced into the London Phamacopeia of 1809, as affording a combination of iron diſtinct from any other, and often applicable to practice. It ſeems to be a triple ſalt, formed by the union of nitric acid with red oxyd of iron, and with potaſs. Dr. Lewis has obſerved, that alkaline ſolutions of iron are ill adapted for medicinal uſe; and on that account, he ſays, they have been wholly neglected in modern practice. 12. "Vinum ferri," wine of iron, P. L. 1787 and 1809, "Vinum chalybeatum," P. L. 1745, conſiſts of two ounces of iron-filings mixed in two pints of wine. The mixture is ſet by for a month, occaſionally ſhaking it, and it is then filtered through paper. Lewis Mat. Med. Cullen Mat. Med. London Pharmac. 1809. See *Chemical Properties of* IRON, *Chalybeates*, and *Mineral*, &c. WATERS.

IRON, *Caſe-hardening of*, a proceſs by which a ſuperficial hardneſs is given to various articles made of iron. It is found by experience that pure iron is not ſuſceptible of a very fine poliſh, and that, when it is expoſed to the air, it very ſoon changes. All iron utenſils, therefore, ſuch as fire irons, and many other articles, having the appearance of poliſhed ſteel, are caſe-hardened, for the purpoſe of giving them a finer poliſh, as well as rendering their colour more permanent. The goods to be caſe-hardened ſhould be finiſhed with the exception of poliſhing, ſince, if the proceſs be well managed, the moſt delicate workmanſhip will not be injured. A box of wrought iron muſt be provided, which is perfectly ſound in every part, having a lid of the ſame metal, to fit very tight. In this box the articles are to be ſtratified with powdered carbon, that of animal ſubſtances being the beſt, for reaſons given in the article IRON, in the ſection on *Steel.* The box being perfectly filled with theſe materials, let the lid be fitted on, and luted all round with a paſte made of equal parts of pipe-clay and Calais ſand. The whole is now to be ſurrounded by bricks looſely built up, a little higher than the top of the box, leaving about four inches on each ſide for fuel. This may be done either upon a ſmith's hearth or in the open air. The moſt proper fuel is the refuſe-cokes from any fires where pit-coal is burnt. The fire being kindled, and the ſpace filled up with this fuel, the heat will be applied gradually, owing to the ſmothered combuſtion. As ſoon as the box appears of a light red heat, let it remain about half an hour, or more time if the box be large, in the ſame temperature. The lid may now be taken off, and the box inverted and its contents emptied over a ciſtern of cold water. If the box be ſuffered to cool without being opened, the goods will be perfectly white and metallic when taken out. If they are now heated red-hot, and quenched in cold water, they acquire the ſame hardneſs as if turned out of the box red-hot into the water. If the articles are very delicate, ſo as to be injured by the air in heating a ſecond time, they may be preſerved, by dipping them into a mixture of a ſaturated ſolution of ſalt (muriate of ſoda) with any vegetable matter to give it a pulpy conſiſtence. During the time of heating it red-hot, the ſalt fuſes upon the ſurface of the metal, defending it from the oxygen, ſo that after it is quenched in the water, and bruſhed, it will be perfectly clean.

The ſize of the iron box ſhould not be very large; it is better to do the work at two or three proceſſes. Charcoal is a very bad conductor of heat, and if the maſs to be heated were large, thoſe articles near the ſides would be over done, by combining with too much carbon, while thoſe in the middle would be too little carbonated.

People in the habit of caſe-hardening, have generally ſome ſecret receipt for the proceſs, on which they ſet great value. All, however, agree in uſing carbon, the only thing neceſſary: ſome add to this ſalt-petre; others ſal ammoniac, and other articles, to which they very knowingly attribute their relative ſucceſs. We can, however, aſſure the moſt ſage of theſe perſons, that if they make their box perfectly air-tight, by the rules above given, ſtratifying the articles with animal carbon alone, they will, with proper heat and time, produce the greateſt poſſible effect.

Animal carbon may be produced from moſt animal ſubſtances: among theſe are blood, hoofs, and leather. Theſe ſubſtances ſhould be preſſed into an iron pot, which can be heated red-hot, covered cloſe, with a ſmall open tube inſerted into the cover. The volatile matter that eſcapes may be ſet on fire, which will in a great meaſure deſtroy the ſmell; or a receiver may be adapted, and the crude ammonia diſtilled off. When the volatile ſubſtances have come over, the reſiduum will be fine animal carbon, which requires only to be reduced to powder.

This animal carbon is ſo fitted for combining with iron, that if it be made into a pulp with a ſaturated ſolution of ſalt, and laid upon the ſurface of iron; upon being heated red-hot, and quenched in cold water with this coating upon it, the ſurface will become hard. Any part of an iron article, not wiſhed to be *caſe-hardened*, may be prevented from undergoing the change, by covering the part with pipe-clay.

IRON, *For the blueing of*, ſee BLUEING.

IRON, *For the expanſion of, by heat*, ſee HEAT and PYROMETER.

IRON *Chambers*. See CHAMBERS.

IRON, *For the refining of*. See REFINING and IRON, § 4. *ſupra.*

IRON, *For the converſion of, into ſteel*. See IRON and STEEL.

IRON *Furnace*. See BLAST-*Furnace*, and IRON, *ſupra.*

IRON, *Harping*. See HARPING.

IRON-*liquor*, in *Calico Printing* and *Dyeing*, is a ſolution of iron in the acetic acid, uſed as a mordant for certain colours. It is employed as a ſubſtitute for the ſulphat of iron, and is preferred, in thoſe proceſſes, to the laſt ſalt. The oxyd of iron, which is the eſſential ingredient, is more eaſily attracted by the ſtuff from the acetic than the ſulphuric acid, and, beſides, the texture is not ſo liable to be injured by the acetat as the ſulphat of iron. In order to make this ſubſtance cheap, the acid diſtilled from wood, called pyrolignic acid, and now found to be impure acetic acid, is uſed as a ſubſtitute for vinegar. See PYROLIGNIC *Acid*, and the laſt ſection of the article IRON.

IRON *moulds* are marks or ſtains produced on ſubſtances, particularly linen and cotton, by the oxyd of iron. The affinity of theſe vegetable ſubſtances for the oxyd of iron is ſo great, as not only to take it from the ſurface of iron, but from any acid with which it may be combined. We find, hence, that very few acids are capable of removing iron-moulds. From the well-known fact that the attraction of acids for oxyds of metals is more feeble as the latter contain more oxygen, we are enabled to account for iron-moulds being eaſier to remove, as they are more recent. The ſtain ſoon acquires an orange-red colour, by abſorbing oxygen, and is with more difficulty extracted. Various means are employed by the laundreſſes for removing ſtains of iron, the moſt general of which is the citric acid, commonly called ſalt of lemons. The muriatic acid is frequently employed by the bleachers, and it is by far the moſt rapid and effectual proceſs; but the great caution neceſſary, in ſuddenly waſhing the ſpot after the ſtain has diſappeared, leſſens its utility for domeſtic uſe. When the ſpot is dipped into the clear muriatic acid, the iron almoſt inſtantly diſappears, and it is at that inſtant the part ſhould be plunged into a quantity of clean water, and waſhed as quick as poſſible; the waſhing being continued for a conſiderable time.

In order to render the oxyd of iron more eaſily ſoluble by any acid, let the part ſtained be ſteeped for ſome time in a ſolution of ſulphuret of potaſh, or, what is more eaſily obtained, ſulphuret of lime, rinſing it afterwards in clean water. The oxyd will be deprived of ſome of its oxygen, and may be removed by almoſt any acid, when it is ſo dilute, even, as not to injure the ſtuff, however long it may remain in it.

It may be proper here to obſerve, that the tartaric and oxalic acids remove iron-moulds equally well with the citric acid.

When the ſubſtance iron-moulded is printed calico, and of a buff colour, or any other colour in which iron is employed as a mordant; it will be found that, in removing the iron-mould, the proper colour will alſo diſappear. In this caſe there is no effectual remedy.

Moſt of the iron-moulds are produced in the waſhing, for want of ſufficient caution. In thoſe utenſils in which metal is at all neceſſary, copper or zinc ſhould be employed inſtead of iron. With care, however, iron veſſels may be ſafely uſed. When they are not in uſe, the ſurface of the iron ſhould, after being made clean and dry, be ſmeared over with oil or tallow, and rubbed dry at the time they are uſed.

Iron-*moulds*, yellow lumps of earth or ſtone, found in chalk-pits about the Chiltern, in Oxfordſhire, and elſewhere, being in reality a kind of pyrites, or indigeſted iron-ore.

Iron-*ſhot*, in *Mineralogy*, is a term applied by Mr. Jameſon (Geognoſ. vol. iii. p. 47. 159.) to ſuch rocks and ſtones as are coloured or clouded by the oxyds of iron. Ferruginous is a more common name for this very common appearance in the ſtrata.

Iron-*ſick*, a *Nautical Term*, ſignifying the decay of the iron faſtenings by its corroſion with the ſea-water, by which the continuity of the parts is gnawed away by degrees, whereby the veſſel is not only rendered weak, but leaky.

Iron-*ſtone*, is that ſpecies of iron ore which abounds with a conſiderable proportion of earth, ſuch as lime, or alumine, and is the ore moſt common in this country. See Iron.

The manner of getting iron-ſtone is divided into three departments: 1. By *ſtall-work*: 2. By *bell-pits*: and 3. By *open-work*. The firſt of theſe methods is employed when the ſtone lies at a conſiderable depth. After ſinking a ſhaft to the lower part of the ſtratum, the ground is excavated in an horizontal direction, leaving at intervals certain parts ſtanding to ſupport the roof of the excavation. The ſpaces between theſe pillars are called *ſtalls*.

The *bell-pit* is employed when the iron-ſtone lies at ſome diſtance from the ſurface, and where the ground is not ſufficiently firm to admit of ſtall-work. Theſe pits, when firſt opened, are narrow, but become wider below, aſſuming the ſhape of a bell.

The third method, or the *open-work*, is made uſe of when the ſtratum containing the ſtone is nearly baſſeting, or is very near to the ſurface. The earth is firſt removed, laying the ſtratum containing the ore bare, and the ſtone is got out as from an open quarry.

The argillaceous iron ores are generally called iron-ſtones, and abound in many of the coal diſtricts. In Mr. Farey's Agricultural and Mineral Report on Derbyſhire, vol. i. p. 217, a liſt of ſeventy-five places in and near that county is given, where iron-ſtone has been dug, or where the rakes of iron-ſtone, as they are there called, have been worked.

Iron-*wood*, in *Botany*. See Sideroxylon.

Iron-*work*, in a *Ship*, denotes all the pieces of iron, of whatſoever figure or ſize, which are uſed in its conſtruction; as bolts, boom-irons, which are compoſed of two rings, nearly reſembling the figure of 8, nails, ſpikes, chains, and chain plates, block-ſtrops, cranks, braces, pintles, and goodgings.

Iron-*works*, a name given to the eſtabliſhments for the manufacture of pig-iron. (See Blast-*furnace* and Iron.) The moſt proper ſituation for iron-works is on the ſide of a hill, from which a perpendicular deſcent could be formed nearly equal to the height of the blaſt-furnace. The upper ground by this means is on a level with the mouth of the furnace, where all the materials are introduced, and is therefore the ſituation where the ore is roaſted, and the cokes prepared; the lower ground being the moſt proper for the reſt of the works.

Where ſuch local advantages do not exiſt, the materials are drawn up on an artificial inclined plane, by appropriate machinery.

Iron-*wort*, in *Botany*. See Galeopsis and Sideritis.

Iron *Iſland*, in *Geography*, a ſmall iſland in the Eaſt Indian ſea, near the coaſt of Siam. N. lat. 12° 35′. E. long. 98°.

Iron *Lough*, a lake of Ireland, in the county of Weſtmeath, through which the river Inny paſſes. It is about five miles N.W. from Mullingar.

Iron *Mountains*, a chain of American mountains, in Teneſſee, extending from the river Teneſſee to that of French Broadtown, S.W. to N.E. and conſtituting the boundary between Teneſſee and North Carolina, and reaching from near the lead mines, on the Kanhaway, through the Cherokee country, to the ſouth of Chota, and terminating near the ſource of Mobele. This chain abounds with caverns and cataracts.

IRONDEQUET, a bay on the ſouth ſide of lake Ontario.

IRONSIDE, Gilbert, in *Biography*, an Engliſh prelate, was born at Hawkſbury, in Oxfordſhire, in 1588, and educated at Trinity college, Oxford. Soon after he entered upon holy orders, he obtained the rectory of Winterburn, in Dorſetſhire. At the reſtoration he was made biſhop of Briſtol. He died in 1671. He was author of "Queſtions on the Sabbath," and a ſermon. Wood.

IRONY, derived from [illegible], *diſſimulation*, in *Oratory*, a figure in ſpeech, whereby we plainly intend ſomething very different from what our words expreſs; as when we ſeem to praiſe a perſon at a time when we evidently rally and diſcommend him.

Quintilian calls this figure *diverſiloquium*, *diſſimulation*, and *illuſion*: and obſerves that it may be known by the manner of the pronunciation, or from the nature of the perſon or the thing. The ſubjects of irony are vices and follies of all kinds: and it has thus been uſed by the moſt grave perſons on proper occaſions. Socrates uſed it ſo much as to acquire the name of [illegible], or the *droll*. It was alſo uſed by the prophet Elijah, 1 Kings, xviii. 27, by Solomon, Eccleſ. xi. 9, and by our Saviour himſelf, Mark, vii. 9.

IROQUOIS. See SIX *Nations*.

IROQUOIS, *National Muſic*. Claude Perrault, an unbeliever in the harmony or counterpoint of the ancients, tells us, in his "Phyſical Eſſays," that Louis XIV., near the end of his reign, when ſome of the Iroquois nation were brought into France, wiſhing to hear them ſing, that he might form ſome idea of their muſic, many of them ſung their wild melodies in uniſons and octaves, while others accompanied them in grunting like pigs; regularly, however, marking the meaſure by a violent jolt. And thus they attempered the acute voices by the mixture of the *grave grunts* and rhythmical pulſations of the others.

Perrault imagines, from the deſcription which Caſſiodorus gives of harmony, or ſinging together, which the ancients called *ſymphony*, that Roman harmony reſembled that of the Iroquois.

IRRADIATION, ſignifies an emanation or ſhooting out of rays, or ſubtle effluvia, from any body. See EMANATION, RAY, EFFLUVIA, and QUALITY.

IRRATIONAL NUMBERS, the ſame as *ſurd numbers*. See SURD and NUMBERS.

IRRATIONAL *Quantities*. See RATIONAL *Quantities*.

IRRATIONAL *Soul*. See SOUL.

IRREDUCIBLE CASE, in *Algebra*, is an expreſſion ariſing from the ſolution of certain equations of the third degree, which always appears under an imaginary form, notwithſtanding it is, in fact, a real quantity, but the reduction of it to a rational, or irrational finite expreſſion, has at preſent reſiſted the united efforts of many of the moſt celebrated mathematicians of Europe. Every cubic equation may be reduced to the form $x^3 + ax = b$; and then, according to the common rule,

$$x = \sqrt[3]{\frac{b}{2} + \sqrt{\frac{b^2}{4} + \frac{a^3}{27}}} + \sqrt[3]{\frac{b}{2} - \sqrt{\frac{b^2}{4} + \frac{a^3}{27}}}.$$

See EQUATIONS.

Now, when a is negative, $\frac{a^3}{27}$ is alſo negative; and, therefore, when $\frac{b^2}{4} < \frac{a^3}{27}$, the quantity under the inferior radical, *viz.* $\sqrt{\frac{b^2}{4} - \frac{a^3}{27}}$, is imaginary; becauſe we cannot extract the ſquare root of a negative quantity; and this is what conſtitutes that which is generally called the irreducible caſe. This difficulty ſoon preſented itſelf to Cardan, after Tartalea had communicated to him his method for the ſolution of cubic equations, which rule is now commonly, though very improperly, attributed to the former. Cardan informs Tartalea, in a letter dated Auguſt 4th, 1539, that he underſtood the ſolution of the equation $x^3 + ax = b$, and alſo of $x^3 - ax = b$, when $\frac{b^2}{4} > \frac{a^3}{27}$; but when $\frac{b^2}{4} < \frac{a^3}{27}$, his attempts always failed; and he therefore begged of Tartalea to clear up his difficulty, by ſending him the ſolution of the equation $x^3 - 9x = 10$. Tartalea was himſelf perfectly aware of this difficulty, but he was by no means ſatiſfied with Cardan's conduct, whom he at that time ſuſpected to be about publiſhing as his own the rules he had taught him; and, therefore, inſtead of giving him an explicit anſwer, he writes to him in the following terms.—"M. Hieronime, I have received your letter, in which you write, that you underſtand the rule for the caſe $x^3 - ax = b$, when $\frac{b^2}{4}$ is greater than $\frac{a^3}{27}$, but when $\frac{a^3}{27}$ exceeds $\frac{b^2}{4}$, you cannot reſolve the equation; and, therefore, you requeſt me to ſend you the ſolution of the equation $x^3 - 9x = 10$. To which I reply, that you have not uſed a good method in that caſe, and that your whole proceſs is entirely falſe. As to reſolving you the equation you have ſent, I muſt ſay that I am very ſorry that I have already given you ſo much as I have done; for I have been informed by a credible perſon, that you are about to publiſh another algebraical work, and that you have been boaſting through Milan of having diſcovered ſome new rules in algebra. But take notice, that if you break your faith with me, I ſhall certainly keep my word with you, nay, I even aſſure you to do more than I promiſed." (Dr. Hutton's Mathematical Dictionary, article ALGEBRA.) Tartalea, however, notwithſtanding what he ſays in this letter, was himſelf well aware of the difficulty in queſtion, as appears from ſome of his private memoranda: and from that time to the preſent, which is near 300 years, the ſame impediment remains, notwithſtanding the repeated attempts of many very diſtinguiſhed mathematicians; in fact, there is great reaſon to ſuppoſe, independently of the failure of ſo many ingenious attempts, that the formula is inexpreſſible in any other finite form, than that under which it naturally ariſes by the ſolution. See EQUATIONS.

Notwithſtanding, however, that no analytical ſolution can be given to the caſe in queſtion, every equation of this form has three real roots, which are obtainable by other methods, ſuch as by means of a table of ſines and tangents, infinite ſeries, continued fractions, and a new method, lately publiſhed by Mr. Barlow in the Mathematical Repoſitory, which ſeems by far the readieſt and moſt accurate of any that has been at preſent diſcovered; the rationale of which is as follows;

1. Every cubic equation may be reduced to the form $x^3 \pm ax = \pm b$, by the known rules in algebra; but when the equation is in the irreducible caſe, this ambiguous form ceaſes, and the equation becomes $x^3 - ax = \pm b$; the ſolution of which, by the following method, is the ſame for either ſign of b; only when b is poſitive, the root firſt found will be poſitive, and when b is negative, the root will be negative alſo; it will, therefore, be ſufficient to conſider the caſe $x^3 - ax = b$, in which $\frac{b^2}{4} < \frac{a^3}{27}$, as we have before ſeen.

Now, every equation of the form $x^3 - ax = b$, may be transformed to another dependent equation, in which the co-efficient of the ſecond term ſhall be unity; that is, to another of the form $y^3 - y = c$. For make $x = \frac{y}{z}$, then the equation becomes $\frac{y^3}{z^3} - \frac{ay}{z} = b$; or $y^3 - az^2y = bz^3$: now take $az^2 = 1$, or $z = \sqrt{\frac{1}{a}}$; and, conſequently, $bz^3 = \frac{ba^{\frac{1}{2}}}{a^2}$; whence we have $y^3 - y = \frac{ba^{\frac{1}{2}}}{a^2}$; or putting $\frac{ba^{\frac{1}{2}}}{a^2} = c$, it becomes

$$y^3 - y = c, \text{ as required.}$$

And the value of y being found in this reduced equation, we immediately obtain that of x, in the original one, by means of the expreſſion $x = \frac{y}{z}$, or $x = y\sqrt{a}$.

Now, the original equation being by hypotheſis of the irreducible form, the transformed equation muſt neceſſarily be ſo likewiſe; and, conſequently, $\frac{c^3}{4} < \frac{1}{27}$, or $c < \frac{2\sqrt{3}}{9}$, or $c < .38491$; aſſuming this, therefore, as the maximum value of c, we find that the greateſt value of y can never exceed 1.1549, nor can the leaſt be leſs than unity; ſo that all poſſible values of y lie between the limits 1 and 1.1549; and if, therefore, we have a table containing all the values of c to thoſe of y, between the above limits, we ſhall have by inſpection the ſolution of every equation of the irreducible caſe, when converted into the form $y^3 - y = c$; and hence alſo of every irreducible equation of the form $x^3 - ax = b$, becauſe $x = y\sqrt{a}$.

The following is a table of this deſcription, the value of y being arranged in the leading column, except the laſt digit, which is found in the upper horizontal line, and the reſpective values of c are found in the other columns, being exactly the form that is uſually given to the common tables of logarithms; and the finding of any value of y, correſponding to a given value of c, is performed exactly the ſame as that of finding the natural number to a given logarithm. Thus, for example, giving $y^3 - y = .3837$ to find y: in the table the number correſponding to .38369912 is 1.1543; that is, $y = 1.1543$. It is obvious, therefore, that, from bare inſpection, the value of y may be found true to five places of figures, but theſe are extended to 8 or 9 places *true*, by taking proportional parts as in logarithms; thus, find the next greater and leſs tabular number to that propoſed; and then ſay, as the difference of theſe is to .0001; ſo is the difference between the leaſt of them and the number propoſed, to the part which is to be added unto the leaſt value of y; and this proportion may be ſafely carried to four places at leaſt, and thus the value of y will be known to eight places. This may be demonſtrated as follows: the proportional part that is thus added unto y, is always leſs than .0001, and, therefore, leſs than the $\frac{1}{10000}$dth part of y, and hence it may be ſaid to be very ſmall with regard to y. Now, I ſay, that if a and b be both very ſmall with regard to a third quantity y, that the following proportion is very nearly true; *viz.*

$$(\overline{y+a}|^3 - \overline{y+a}) - (y^3 - y) : (\overline{y+b}|^3 - \overline{y+b}|) - (y^3 - y) :: a : b;$$

for, by rejecting all thoſe powers of a and b higher than the firſt, this proportion becomes preciſely

$$(3y^2 - 1)\,a : (3y^2 - 1)\,b :: a : b;$$

and ſince, in this caſe, a and b are leſs than .0001, (or at leaſt neither of them ever exceed this,) by rejecting the ſquares and cubes of theſe quantities, we cannot have affected the fourth place of figures in the reſult, and therefore the proportion may always be depended upon to four places. And thus, the following rule may be deduced for every irreducible cubic equation, $x^3 - ax = b$; *viz.*

Find $\frac{b\sqrt{a}}{a^2}$ in the following table, and take out the correſponding value of y; then will $y\sqrt{a} = x$ be the root ſought. Let us, for inſtance, take the example propoſed by Cardan to Tartalea; namely, $x^3 - 9x = 10$, to find x.

Here $\frac{b\sqrt{a}}{a^2} = \frac{30}{81} = .37037037$.

Tab. n. .37057828, correſp. n. 1.1499|37037037 given n.
nextleſs .37028164 ——— n. 1.1498|37028164 leſs tab. n.

As 29664 : 1 :: 08873 : 2991

Therefore $y = 1.14982991$
$3 = \sqrt{a}$

and $x = 3.44948973$ as required.

Ex. 2.—Required the value of x in the equation

$$x^3 - 7x = 6.$$

Firſt $\frac{6\sqrt{7}}{7^2} = .32396954$;

Tabula n. .32398835, correſp. n. 1.1339 32396954
Next leſs .32370267, ——— n. 1.1338 32370267

As 28568 : 1 :: 26687 : 9342

Therefore the value of y is 1.13389342;

and $y\sqrt{7} = 1.13389342 \times 2.6457513 = 2.999999999$, as will be found by the operation; which anſwer is true to the 10th place, the real root being 3, as is obvious from the equation. It will be unneceſſary to give any other examples, as the ſame method is purſued in all caſes, and the ſame accuracy may be depended upon in the reſults. The reader who will trouble himſelf to compare the rule here laid down, with any other that has been before given by other writers, will ſoon be convinced of the immenſe labour that is ſaved by the following table; at the ſame time, that the number of figures in the reſult are nearly double thoſe that can be ſafely obtained by the tables of ſines and tangents.

For the method of finding the other two roots after one is obtained, ſee EQUATIONS; for the ſolution of cubic equations by the triſection of an angle, ſee Bonnycaſtle's Trigonometry; and for the method by infinite ſeries, ſee Philoſophical Tranſactions, vols. lxviii. and lxx.

IRREDUCIBLE CASE.

Table for the Solution of the Irreducible Caſe in Cubic Equations.

y	0	1	2	3	4	5	6	7	8	9
1000	00000000	00020003	00040012	00060027	00080048	00100075	00120108	00140147	00160192	00180243
1001	00200300	00220363	00240432	00260507	00280588	00300675	00320768	00340867	00360973	00381084
1002	00401201	00421324	00441453	00461588	00487294	00501876	00522030	00542189	00562354	00582525
1003	00602703	00622886	00643075	00663271	00683472	00703679	00723893	00744112	00764337	00784569
1004	00804806	00825050	00845299	00865555	00885817	00906084	00926358	00946637	00966923	00987215
1005	01007513	01027816	01048126	01068442	01088764	01109092	01129426	01149766	01170112	01190464
1006	01212822	01231186	01251556	01271932	01292314	01312702	01333907	01353497	01373903	01394316
1007	01414734	01435159	01455589	01476026	01496469	01516917	01537372	01557833	01578299	01598772
1008	01619251	01639736	01660227	01680724	01701227	01721736	01742252	01762773	01783300	01803833
1009	01824373	01844918	01865470	01886027	01906591	01927160	01947736	01968318	01988906	02009500
1010	02030100	02050706	02071318	02091936	02112560	02133191	02153827	02174470	02195118	02215773
1011	02236433	02257100	02277772	02298451	02319136	02339827	02360524	02381227	02401936	02422652
1012	02443373	02464100	02484834	02505573	02526319	02547070	02567828	02588592	02609317	02630138
1013	02650920	02671708	02692501	02713302	02734109	02754921	02775740	02796564	02817395	02838232
1014	02859074	02879923	02900778	02921639	02942507	02963380	02984259	03005145	03026036	03046934
1015	03067838	03088747	03109663	03130585	03151513	03172447	03193388	03214334	03235286	03256245
1016	03277210	03298180	03319157	03340140	03361129	03382124	03403152	03424133	03445146	03466166
1017	03487191	03508223	03529261	03550305	03571355	03592411	03613473	03634542	03655661	03676697
1018	03697783	03718876	03739974	03761080	03782190	03803308	03824431	03845561	03866965	03887838
1019	03908986	03930140	03951300	03972466	03993638	04014816	04036001	04057192	04078388	04099591
1020	04120800	04142015	04163236	04184464	04205697	04226937	04248182	04269434	04290692	04311956
1021	04333226	04354502	04375785	04397074	04418368	04439669	04460976	04482289	04503608	04524933
1022	04546265	04567602	04588946	04610296	04631652	04653014	04674382	04695757	04717137	04738524
1023	04759917	04781316	04802721	04824132	04845549	04866973	04888402	04909838	04931280	04952728
1024	04974182	04995643	05017109	05038582	05060061	05081546	05103036	05124534	05146037	05167547
1025	05189063	05210584	05232112	05253646	05275187	05296733	05318286	05339844	05361409	05382980
1026	05404558	05426141	05447730	05469326	05490928	05512534	05534150	05555770	05577397	05599030
1027	05620668	05642313	05663964	05685622	05707285	05728955	05750630	05772312	05794000	05815695
1028	05837395	05859102	05880815	05902534	05924259	05945990	05967727	05989471	06011221	06032977
1029	06054739	06076507	06098282	06120062	06141849	06163642	06185441	06207247	06229058	06250876
1030	06270000	06294530	06316366	06348209	06360057	06381912	06403773	06425640	06447514	06469393
1031	06491279	06513171	06535069	06556973	06578884	06600800	06622723	06644653	06666588	06688529
1032	06710477	06732431	06754391	06776357	07698329	06820308	06842293	06864284	06886281	06908284
1033	06930294	06952309	06974331	06996360	07018394	07040435	07062481	07084534	07106593	07128659
1034	07150730	07172808	07194892	07216982	07239079	07261181	07283290	07305405	07327526	07349654
1035	07371788	07393927	07416073	07438226	07460384	07482549	07504720	07526897	07549080	07571267
1036	07593466	07615668	07637876	07660090	07682311	07704538	07726771	07749010	07771256	07793597
1037	07815765	07838029	07860300	07882577	07904859	07927148	07949444	07971745	07994053	08016367
1038	08038687	08061014	08083346	08105688	08128030	08150382	08172739	08195103	08217473	08239849
1039	08262232	08284621	08307016	08329417	08351824	08374238	08396658	08419084	08441516	08463955
1040	08486400	08508851	08531308	08553772	08576242	08598718	8621200	08643689	08666184	08688685
1041	08711192	08733705	08756225	08778751	08801284	08823822	08846367	08868918	08891475	08914039
1042	08936609	08959185	08981767	09004356	09026951	09049552	09072159	09094772	09117392	09140018
1043	09162651	09185289	09207934	09230585	09253243	09275906	09298576	09321252	09343935	09366623
1044	09389318	09412020	09434727	09457441	09480161	09502847	09525627	09548358	09571103	09593855
1045	09616613	09639376	09662147	09684923	09707706	09730495	09753290	09776091	09798900	09821713
1046	09844534	09867360	09890193	09913032	09935878	09958729	09981587	10004452	10027322	10050199
1047	10073082	10095972	10118867	10141769	10164678	10187592	10210513	10233440	10256374	10279313
1048	10302259	10325211	10348170	10371135	10394106	10417083	10440067	10463057	10486053	10509056
1049	10532065	10555080	10578101	10601129	10624163	10647204	10670250	10693303	10716363	10737428
1050	10762500	10785578	10808663	10831753	10854850	10877954	10901063	10924179	10947301	10970430

IRREDUCIBLE CASE.

Table for the Solution of the Irreducible Caſe in Cubic Equations.

y	0	1	2	3	4	5	6	7	8	9
1051	10993565	11016706	11039854	11063008	11086168	11109334	11132507	11155686	11178871	11202063
1052	11225261	11248465	11271676	11294896	11318116	11341345	11364581	11387823	11411072	11434327
1053	11457588	11480855	11504129	11527409	11550695	11573988	11597287	11620592	11643904	11667222
1054	11690546	11713877	11737214	11760557	11783907	11807263	11830625	11853994	11877369	11900750
1055	11924138	11947531	11970932	11994338	12017751	12041170	12064596	12088028	12111466	12134911
1056	12158362	12181819	12205282	12228752	12252229	12275711	12299200	12322695	12346197	12369705
1057	12393219	12416740	12440267	12463800	12487340	12510886	12534438	12557997	12581562	12605133
1058	12628711	12652295	12675886	12699483	12723086	12746695	12770311	12793933	12817562	12841197
1059	12864838	12888486	12912139	12935800	12959466	12983139	13006819	13030505	13054197	13077895
1060	13101600	13125311	13149029	13172753	13196483	13220220	13243963	13267712	13291468	13315230
1061	13338998	13362773	13386554	13410342	13434136	13457936	13481742	13505556	13529375	13553201
1062	13577033	13600871	13624716	13648567	13672425	13696289	13720159	13744036	13767919	13791809
1063	13815705	13839607	13863516	13887431	13911352	13935280	13959214	13983154	14007101	14031055
1064	14055014	14078980	14102953	14126932	14150917	14174909	14198907	14222911	14246922	14270939
1065	14294963	14318992	14343029	14367072	14391121	14415176	14439238	14463306	14487381	14511462
1066	14535550	14559643	14583744	14607850	14631963	14656083	14680209	14704341	14728480	14752625
1067	14776776	14800934	14825098	14849269	14877346	14897630	14921820	14946016	14970219	14994428
1068	15018643	15042865	15067093	15091328	15115569	15139817	15164071	15183331	15212598	15236871
1069	15261151	15285437	15309729	15334028	15358334	15382645	15406963	15431288	15455619	15479956
1070	15504300	15528650	15553007	15577370	15601739	15626115	15650498	15674886	15699285	15723683
1071	15748091	15772506	15796926	15821354	15845787	15870228	15894674	15919127	15943587	15918052
1072	15992525	16017004	16041489	16065980	16090478	16114983	16139494	16164011	16188535	16213065
1073	16237602	16262145	16286694	16311250	16335813	16360382	16384957	16409539	16434127	16458721
1074	16483322	16507930	16532544	16557164	16581791	16606424	16631064	16655710	16680363	16705022
1075	16729688	16754359	16779038	16803723	16828414	16853112	16877816	16902527	16927244	16951969
1076	16976698	17001434	17026177	17050926	17075682	17100445	17125214	17149989	17174770	17199559
1077	17224353	17249154	17273962	17298776	17323596	17348423	17373257	17398097	17422945	17447796
1078	17472655	17497521	17522393	17547272	17572157	17597049	17621947	17646851	17671762	17696680
1079	17721604	17746534	17771471	17796415	17821365	17846321	17871284	17896253	[illegible]	17946211
1080	17971200	17996195	18021197	18046201	18071220	18096241	18121260	18146303	18171343	18196391
1081	18221444	18256504	18271571	18296644	18321723	18346809	18371902	18397001	18422106	18447216
1082	18472337	18497462	18522593	18547731	18572876	18598027	18623184	18648348	18673518	18698615
1083	18723879	18749069	18774265	18799468	18824677	18849893	18875116	18900345	18925580	18950822
1084	18976070	19001325	19026587	19051855	19077120	19102410	19127698	19152992	19178292	19203560
1085	19228913	19254233	19279559	19304892	19330232	19355578	19380930	19406280	19431655	19457027
1086	19482406	19507791	19533182	19558581	19583986	19609396	19634814	19660238	19685668	19711106
1087	19736550	19762001	19787457	19812921	19838391	19863867	19889350	19914840	19940330	19965838
1088	19979135	20016863	20042345	20067914	20093449	20119007	20144539	20170093	20195655	20221224
1089	20246797	20272378	20297965	20323559	20349160	20374767	20400380	20426000	20451627	20477262
1090	20502900	20528546	20554200	20579858	20605524	20631197	20656876	20682561	[illegible]	20733952
1091	20759657	20785369	20811087	20836812	20862543	20888281	20914026	20939777	20965534	20991298
1092	21017069	21042846	21068630	21094420	21120217	21146020	21171830	21197047	21223470	21249300
1093	21275136	21300978	21326828	21352684	21378546	21404415	21430291	21456177	21482061	21507957
1094	21533858	21559767	21585682	21611603	21637531	21663466	21689407	21715355	21741309	21767270
1095	21793238	21819212	21845192	21871179	21897173	21923173	[illegible]	21975104	22001214	22027240
1096	22053274	22079313	22105360	22131413	22157477	22183537	22209611	22235690	22261770	[illegible]
1097	22313967	22340073	22366185	22392304	22418429	22444501	22470599	22496844	[illegible]	[illegible]
1098	22575319	22601491	22627669	22653853	22680044	22706242	22732447	22758657	[illegible]	[illegible]
1099	22837330	22863567	22889811	22916062	22942319	22968581	22994853	23021130	[illegible]	[illegible]
1100	23100000	23126303	23152613	23178930	23205253	23231583	23257919	23284262	23310611	[illegible]
1101	23363330	23389706	23416075	23442458	23468847	23495244	23521645	23548054	23574470	[illegible]
1102	23627321	23653756	23680198	23706647	23733102	23759564	23786033	23812508	23838986	[illegible]

Table for the Solution of the Irreducible Caſe in Cubic Equations.

y	0	1	2	3	4	5	6	7	8	9
1103	27901973	23918474	23944982	23971497	23998019	24024547	24051081	24077623	24104171	24130725
1104	24157286	24183854	24210429	24237010	24263597	24290192	24316792	24343400	24370014	24396635
1105	24423263	24449897	24476537	24503185	24529839	24556499	24583166	24609840	24636521	24663208
1106	24689902	24716602	24743309	24770023	24796743	24823490	24850204	24876944	24903691	24930444
1107	24957204	24983971	25010745	25037525	25064311	25091105	25117905	25144711	25171525	25198345
1108	25225171	25252004	25278844	25305691	25332544	25359404	25386270	25413144	25440023	25466910
1109	25493803	25520703	25547609	25574522	25601442	25628368	25655301	25682241	25709187	25736140
1110	25763100	25790066	25817039	25844019	25871001	25897998	25924998	25952004	25979017	26006037
1111	26033063	26060096	26087136	26114182	26141235	26168295	26195361	26222434	26249514	26276600
1112	26303693	26330792	26357899	26385012	26412131	36439258	26466391	26493531	26520677	26547830
1113	26574990	26602156	26639239	26656509	26683695	26710889	26738088	26765295	26792508	26819728
1114	26846954	26874188	26901428	26928674	26955927	26983187	27010454	27037727	27065007	27092294
1115	27119588	27146888	27174194	27201508	27228828	27256159	27283488	27310829	27338176	27365520
1116	27392890	27420257	27447630	27475011	27502398	27529792	27557192	27584599	27612013	27639434
1117	27666861	27694295	27721736	27749183	27776638	27804098	27831566	27859040	27886521	27914009
1118	27941503	27969004	27996512	28024027	28051548	28079076	28106610	28134152	28161700	28189254
1119	28216816	28244384	28271959	28299541	28327129	28354724	28382326	28409934	28437549	28465171
1120	28492800	28520435	28548077	28575726	28603382	28631044	28658713	28686389	28714071	28741760
1121	28769456	28797159	28824868	28852584	28880307	28908036	28935773	28963516	28991265	29019022
1122	29046784	29074555	29102331	29130115	29157905	29185702	29213505	29241315	29269132	29296956
1123	29324787	29352624	29380468	29408319	29436176	29464040	29491911	29519789	29547673	29575564
1124	29603462	29631367	29659278	29687197	29715121	29743053	29770991	29798937	29826888	29854847
1125	29882813	29910785	29938764	29966749	29994742	30022741	30050747	30078759	30106779	30134805
1126	30162838	30190877	30218924	30246977	30275037	30303103	30331177	30357257	30387344	30415438
1127	30443538	30471646	30499760	30527880	30556008	30584142	30612283	30640431	30668586	30696747
1128	30724915	30753090	30781272	30809460	30837655	30865857	30894066	30922282	30950504	30978733
1129	31006969	31035212	31063461	31091717	31119980	31148250	31176526	31204810	31233100	31261396
1130	31289700	31318010	31346328	31374652	31402982	31431320	31459664	31488015	31516373	31544738
1131	31573169	31601487	31629872	31658264	31686663	31715068	31743480	31771899	31800325	31828757
1132	31857197	31885643	31914096	31942556	31971022	31999495	32027975	32056462	32084956	32113456
1133	32141964	32170478	32198999	32227526	32256061	32284602	32313150	32341705	32370267	32398835
1134	32427410	32455992	32484581	32513177	32541780	32570389	32599005	32627628	32656258	32684894
1135	32713538	32742188	32770845	32799508	32828179	32856856	32885541	32914232	32942929	32971624
1136	33000346	33029064	33057789	33086521	33115260	33144005	33172758	33201517	33230283	33259056
1137	33287835	33316622	33345415	33374215	33403022	33431836	33460657	33489484	33518318	33547159
1138	33576007	33604862	33633723	33662592	33691467	33720349	33749236	33778134	33807036	33835946
1139	33864862	33893785	33922715	33951652	33980595	34009545	34038503	34067467	34096438	34125415
1140	34154400	34183391	34212390	34241395	34270407	34299426	34328451	34357484	34386523	34415569
1141	34444622	34473682	34502749	34531822	34560903	34589990	34619084	34648185	34677303	34706407
1142	34755529	34764657	34793792	34822934	34852083	34881239	34910402	34939571	34968747	34997931
1143	35027121	35056318	35085521	35114732	35143949	35173174	35202405	35131643	35260888	35290140
1144	35319398	35348664	35377936	35407216	35436502	35465795	35495094	35524401	35553715	35583035
1145	35612363	35641697	35671038	35700386	35729740	35759102	35788471	35817840	35847228	35876618
1146	35906014	35935417	35964826	35994243	36023667	36053097	36082534	36111978	36141430	36170887
1147	36200352	36229824	36269303	36288788	36318280	36347780	36377286	36406799	36436319	36465846
1148	36495379	36524920	36554467	36584022	36613583	36643151	36672726	36702308	36731897	36761492
1149	36791095	36820704	36850321	36879944	36909574	36939211	36968855	36998506	37028164	37057828
1150	37087500	37117178	37146864	37176556	37206255	37235961	37265674	37295394	37325121	37354855
1151	37384595	37414343	37444097	37473858	37503626	37533402	37563184	37592973	37622768	37652571
1152	37682380	37712197	37742021	37771851	37801689	37831533	37861384	37891242	37921107	37950979
1153	37980858	38010743	38040636	38070536	38100442	38130356	38160276	38190203	38220137	38250078
1154	38280026	38309981	38339943	38369912	38399888	38429870	38459860	38489856	38519860	38549870

IRREGOLARE, *Ital.* in *Eccleſiaſtical Muſic.* Modes are called irregular in canto fermo, when the compaſs is extended beyond its uſual limits, or its regular ſcale is in ſome unuſual manner, violated.

A cadence, or cloſe, uſed to be termed irregular when the harmony did not cloſe on the key note. (See *Diſappointed* Cadence.) But Rameau has given this title to a particular cadence of his own ſyſtem, in which the fundamental baſe riſes a 5th, or falls a 4th after the chord of the $^{6}_{5}$ to the 4th of the key. See Cadence.

IRREGULAR, ſomething that deviates from the common forms or rules.

Thus we ſay, an irregular fortification, an irregular building, &c. See Building, Fortification, Bastion, and Place.

Irregular *Figure*, in *Geometry*, is that whoſe ſides and angles are not equal. See Regular.

Irregulars, in *Grammar*, are ſuch inflexions of words as vary from the general rule, or pattern.

Irregular, among the *Caſuiſts*, is applied to a perſon who is unqualified for entering into orders, as being a baſtard, maimed, &c. or to an eccleſiaſtic, who is interdicted, ſuſpended, or cenſured, and by that means rendered incapable of holding a benefice, or diſcharging any of the ſacred functions.

Irregular *Bodies*, are ſolids not terminated by equal and ſimilar ſurfaces.

Irregular, in the *Art of Building*, is applied not only to the parts of an edifice which deviate from the proportions eſtabliſhed by antique monuments, and confirmed by architects; as when a Doric column is made nine modules high, or a Corinthian eleven; but alſo to the places and figures of buildings, where the angles and ſides are made unequal, as in moſt of the ancient caſtles; where, without any neceſſity or confinement from the ſituation, they effected ſuch irregularity.

A column is alſo ſaid to be irregular, not only when it deviates from the proportions of any of the five orders, but when its ornaments, whether in the ſhaft, or the capital, are abſurd and ill choſen.

Irregular *Leap*, in *Muſic*. See Leap.

Irregular *Temperament*, or irregular douzeaves, or ſyſtems of twelve notes in the octave, are ſuch as have more than two kinds of tempered fifths, or where the wolf, reſulting or bearing fifth, does not fall between ♯ G and ♭ E, as Mr. Farey has ſhewn in the Phil. Mag. vol. xxxvi. p. 39 and 47. The ſyſtems of lord Stanhope. M. Kirnberger, Mr. Hawke's douzeave, and many others, are irregular ſyſtems: a former diviſion of the ſyſtems of temperament uſed to be into equal and unequal, but as there could be but *one* equal temperament, ſuch a diviſion anſwered little purpoſe: the equal temperament is a regular douzeave, wherein the wolf is equal to each of the temperaments of the fifths, as ſhewn in the 6th ſcholium, in Mr. Farey's paper above referred to.

Irregular *Diatonic Intervals*, are ſuch as, when expreſſed in any notation by three very ſmall other intervals, and arranged in a table, do not increaſe pretty regularly in each of their three terms.

Irregular *Meaſures*, in *Mining*, are variable meaſures or ſtrata in thickneſs, ſometimes called *Girdles* (ſee that article); and according to Mr. William Martin (Outlines, p. 171.) include alſo ſtrata that take a different direction in their dip from that of their attendant ſtrata: in which latter caſe, we apprehend, that obſervers have moſtly overlooked ſome *fault* which ranges between the irregular ſtrata and their attendant ſtrata, and have detached and altered their poſitions, or that the ſtratula, or folia (of which this author takes no notice), that often croſs beds of ſtone oblique to their ſtrata-ſeams or way-boards, have been miſtaken for the latter, as often has happened. Numerous inſtances of variable or irregular meaſures have been noticed by Mr. Farey in his Survey of Derbyſhire and its Environs, and are particularized in his Agricultural and Mineral Report to the Board of Agriculture, vol i. p. 176. 238. 276, &c. Others have been obſerved by Mr. James Keir, in Shaw's Hiſtory of Staffordſhire; and in Mr. Weſtgarth Forſter's Treatiſe on a ſection of ſtrata. They are indeed very important geological phenomena.

IRREGULARITIES *in the Moon's Motion.* See Moon.

IRREPLEVIABILE Returnum. See Returnum.

IRREPLEVIABLE, or Irreplevisable, in *Common Law*, ſignifies what may not be replevied, or ſet at large upon ſureties.

IRRIGATION, in *Agriculture*, the art of covering meadow or graſs-lands with water, ſo as to render them more highly productive and beneficial. It may be noticed, that there are two methods of effecting improvements on lands by covering them with water; one of which is by applying it ſo as to cover the ſurface when in the ſtate of graſs or ſward; the other by communicating it to the ſoil of ſuch grounds as have been broken by means of cultivation. The firſt is the method that has been principally introduced into practice in this kingdom, and which, by a late writer, has been termed the "European practice of irrigation." But though the hiſtory of the origin of this means of improvement is involved in much difficulty, and not capable of being eaſily traced; it was probably introduced at a very early period from eaſtern countries, where the practice of covering the lands with water, in order to protect them from the injurious effects of exceſſive heat, has prevailed for ages; yet by ſome it is thought to have been brought to the attention of the farmer in this country in another way, for the benefit of natural floods, to the graſs-lands which they occaſionally overflowed, being evident, and in ſome inſtances great, the means of producing artificial floods, and of ſpreading them over lands, not liable in their natural ſituation to be overflowed, would become, of courſe, it is ſuppoſed, a deſirable object. And that as the moſt obvious effect of floods, or the overflowings of rivers and brooks on the lands over which they ſpread, is that of depoſiting their feculent particles; thereby operating as a vehicle of manure; it is likewiſe evident to common obſervation, that foul waters, as thoſe of floods, let fall their feculencies, moſt freely, in a *ſtagnant ſtate*. Further, that "it is alſo equally evident, that the ſtate of ſtagnation of the waters of floods, or a ſtate that approaches it, is cauſed by ſome obſtruction of the current below the place of ſtagnation." And that "from theſe circumſtances being ſeen, and they could not well be miſſed by any one who gave the ſubject a ſecond thought, the means of manuring lands with water, artificially, were given: in ſituations it is meant which would admit of the requiſite obſtructions" And it is further ſuggeſted, that "the bottoms, dips, or vallies, which abound, more or leſs, in every part of the kingdom, would naturally be the moſt apt ſubjects for flooding artificially with foul waters, on the principle of manuring the land with their ſediment." For on "a bank, or dam, being made acroſs the valley, below the part to be manured, the rivulet which generally accompanies a valley of this kind, eſpecially after heavy rains, the only time when flooding on this principle could be practiſed, would of courſe be obſtructed; and its waters, fouled, perhaps, with the richeſt particles.

particles of arable lands, be ſpread over the bottom of the valley, to an extent proportioned to the height of the bank, and its own flatneſs: a valve or flood-gate being fixed in the bed of the rivulet to let off the waters, when the *whole* of their foulneſſes were depoſited: thus gaining a principal advantage over natural flooding; in which the groſſer particles only are let fall; the finer, and perhaps moſt valuable eſcaping to the river, and thence to the ſea, before they be precipitated or let fall upon the land." It is conceived that on theſe principles, it is evident, ſome of the meadow-lands of the midland diſtricts have formerly been flooded; and that it is not probable, that ſo evident a method of improving meadow-lands ſhould have been confined to a particular diſtrict; but may have been common to other parts of the iſland. And it is further ſtated by the ſame writer, that the *ancient* method of meliorating graſs-lands, by the means of *ſtagnant* water, could no longer prevail, than until the ſuperior effects of running water, on ſuch lands, were diſcovered and aſcertained. And that this important diſcovery muſt have been made by *obſervation*, on the comparative effects of running and ſtanding water, in the natural and artificial flooding ſpoken of above; and muſt have been aſcertained by a long courſe of *experience:* as it is not likely that *reaſon* ſhould have had any ſhare in ſtriking out the modern method of improving graſs-lands by running water. For even now, when the reality of the improvement appears to be fully eſtabliſhed, there ſeems to be no full or ſatisfactory *theory* to account for it: though many of the effects thus produced have lately been more clearly explained and better underſtood, as will be ſeen below. The *warmth*, communicated by running water to the graſs it flows over, is one great reaſon adduced for the good effect of running water on this ſort of land. But even after this diſcovery was made, and the effect fully eſtabliſhed, it would be ſome length of time before the art arrived at its preſent high degree of perfection. As it may, in its preſent ſtate, be ſafely deemed the moſt uſeful and ſcientific operation, that has entered into the common practice of huſbandry. And the memory of the inventor, or inventors, deſerves the higheſt praiſe and admiration.

It has likewiſe been remarked, that the great degree of verdure and luxuriance which almoſt immediately ſucceeds the occaſional covering of graſs-lands with water, ſufficiently demonſtrates the power which it poſſeſſes in promoting vegetation: and that it is a means of fertility that has been employed for ages in more warm climates, with the moſt beneficial conſequences in increaſing the quantity of vegetable produce. But that although it has been long in uſe in other countries, and of late more particularly attended to in this, the principle on which it produces its effects are not yet fully explained.

In conſidering manure as the nouriſhment or food of plants, ſome of the properties of water, that may be beneficial in the vegetable economy when abſorbed or taken up by the fibrous roots of plants, have been mentioned; and there are other ways in which it may be advantageous in forwarding the growth of graſs herbage when applied over the ſurface. It is conceived that in climates where the heat is conſiderable, it may be of much utility, not only by keeping the fine fibrous roots of the graſs or other plants in a moiſt patulous ſtate, the moſt proper for the purpoſes of abſorption, but in ſuch a temperature or ſtate of heat, from the cooling effect produced by the conſtant evaporation that is taking place near the ſurface of the ground, as is the moſt ſuitable for their healthy and vigorous growth. It is probably in this way that garden plants are principally benefited by the application of water in the hot ſummer ſeaſons in our own climate; as when the waterings are not conſtantly kept up injury rather than good is moſtly experienced. But that another and more beneficial way in which graſs produce may be immediately increaſed, and the fertility of the lands more permanently improved in this country by the floating or covering them with water, is from the waters of the rivers or brooks that are turned upon them, containing, either in the ſtate of ſolution or diffuſion, a variety of different ſorts of enriching materials which they gradually and evenly depoſit upon the ſurface while they reſt upon or ſlowly flow over it. This muſt, it is imagined, be the caſe in all thoſe inſtances where the rivers or ſtreamlets either ariſe in, or in their courſe flow through or over beds of chalk, marle, or other calcareous ſtrata; as in their paſſage they become highly impregnated with the fine particles of theſe different ſubſtances. And where they are fed by the ſmall runlets which receive the waters that proceed from the higher and more elevated lands, they muſt often, eſpecially after heavy rain, be loaded with a large proportion of fine rich materials of the animal, vegetable, or other kinds, which they depoſit in a regular manner in their tardy trickling courſe over the ſurfaces of the fields below.

It would appear that waters thus impregnated produce the moſt beneficial effects, particularly when not in flood, upon the lands that are the neareſt to the ſources whence they become principally impregnated with their fertilizing principles; as when they have flowed to ſome diſtance they have, in a great meaſure, depoſited and let fall ſuch enriching ſubſtances, and are become too pure for affording advantage in the way of depoſition. It is only in the time of floods that they can produce much utility in this way at any great diſtance. It was found by an able philoſophical writer, Dr. Darwin, that the water of the Derwent, though it flows for ſeveral miles near Matlock, through calcareous ſtrata, contained no impregnation of this ſort on its reaching Derby, although the ſprings in that neighbourhood had a large proportion of it in their compoſition. And the ſame author has ingeniouſly ſuggeſted another mode in which water may prove ſerviceable in floating grounds in this climate, which is that already ſtated of protecting the graſs or other plants from the too ſevere effects of cold during the winter, or early ſpring ſeaſon. In this view it is obſerved, that the water of ſtrong ſprings, which in this country have conſtantly the temperature of forty-eight degrees of Fahrenheit's thermometer, is to be preferred to that of rivers, where it can be procured in a ſufficient proportion, as the degree of cold in theſe is in the ſame ratio with that of the atmoſphere, till it declines to the freezing point, or that of thirty-two. Though both, when ſpread out, forming a thin ſheet of ice on the ſurface of the land, are beneficial in defending the roots of the graſs plants from too intenſe degrees of cold, and of thus preſerving them in a more healthy condition; and it is added, that thoſe of ſome ſorts of graſſes are ſuppoſed even to vegetate beneath the ice, as the rein-deer moſs in Siberia moſtly vegetates beneath the ſnow, in a degree of heat of about forty, which is the medium between that of the inferior ſurface of the diſſolving ſnow, or that of thirty-two, and that of the common heat of the internal parts of the earth, which is forty-eight; and in this manner the graſs produce in this cold country be conſiderably increaſed, ſo as, under proper management, to nearly double the uſual annual quantity under other circumſtances.

In further illuſtration of theſe principles it may be obſerved, that the water iſſuing from ſprings where they abound with particles of gravel, or a ſlaty, mouldering kind of rock, containing a large proportion of calcareous earth, are known from experience to be better adapted to the purpoſe

poſe than that which ariſes from others that do not contain ſuch materials. The difference in the effects, often ſo viſibly produced, has been accounted for, from watering one field from a ſpring iſſuing out of a chalky ſoil, over thoſe which take their riſe in another, ſimilar in every reſpect and management, except that the water applied ariſes in, or flows through, a ſwamp or moraſs, compoſed chiefly of peat earth, or proceeds from ſituations known to contain none of theſe ſubſtances. However, the fact is unqueſtionably eſtabliſhed, that the water of rivers which run through comparatively level and fertile countries, is not only better than that of ſuch as have their courſes through mountainous, unproductive tracts, but ſuperior to all others, as every different ſtreamlet adds a new acceſſion of fertilizing materials, which, being diſperſed over the ſurface of the meadows, in their fine and attenuated ſtate, cannot avoid adding a conſiderable degree of improvement to the lands.

It is conceived by Mr. Marſhall, that if the art, as it now ſtands, were ſtruck out on principle, it muſt have been on that of animal circulation; to which the operation of meliorating graſs-lands with water, through the means of floats and drains, is perfectly analogous. The floats are arteries, conveying the circulating fluid to every part of the ſubject, imbuing every atom: the drains, veins, collecting the ſcattered fluid, and conveying it back to its natural channel. But that, in leſs figurative language, the floats may be conſidered as trenches, receiving, by the means of flood-gates, as occaſion requires, the water of a river, brook, or rivulet, and conveying it along the upper margin, and upon the tops of the natural or artificial ſwells of the field of improvement:—the drains, counter-trenches, ſtretching along the lower margin, and winding in the dips and hollows, to receive the waters ſpread over the ſurface by the floats.

Each ſet of trenches, whether of floats or drains, bears more or leſs reſemblance to a tree, with its trunk and branches: the branches of the floats increaſing in number, and diminiſhing in ſize, as they proceed from the river or other ſource; thoſe of the drains, on the contrary, diminiſhing in number, and increaſing in ſize, as they approach the receptacle or place at which the water is to be diſcharged. And it is further remarked, that when the water is at work, as it is properly enough termed, the entire ſurface, ſuppoſing the operation to be perfect, is covered with one continued ſheet of living *water*, purling ſlowly and evenly over every part, an inch or more deep. If the graſs be very ſhort, the water is ſeen, and has a beautiful as well as a profitable effect: if not, it ſteals, unſeen, among the herbage, or ſhews itſelf, partially: it being impoſſible, in practice, to render the ſheet throughout of an uniform depth or thickneſs, as it muſt naturally paſs off quicker in ſome ſituations than others.

From this general idea of the method of watering graſs-lands, on the modern principle, it is clearly ſhewn that a dead flat, a perfect level, is, of all others, the leaſt adapted to the practice. A perfect level, however, ſeldom occurs in nature; inequalities, ſufficiently to promote a circulation of water on the turfy ſurface, may generally be diſcovered, if judiciouſly ſought. In the midland counties, Mr. Marſhall has ſeen in the practice of a ſuperior manager a beautifully ſimple expedient practiſed, to find out the inequalities of a piece of ground nearly flat: which is that of covering it with water, and preſerving the level by the means of levelling pegs, ſtumps or piles driven down in various parts to a level with the ſurface of the water; ſo that, after the water was let off, the level ſtill remained. The parts laſt covered were, of courſe, the proper ground for the floats; the parts laſt freed for the drains; art being uſed, where wanted, to give additional advantage to the natural inequalities which may be preſent. But ſituations in general (water-formed lands excepted), abound, he thinks, ſufficiently with inequalities of ſurface: either natural, as the ſwells and hollows of lands, lying out of the way of floods, and having never been ploughed: or artificial, as thoſe which have been raiſed by the plough into ridge and furrow: in this caſe the ridges receive the floats, the furrows the drains: in that, the plummet is the guide to the floats; the water they throw out, to the drains or cuts to be formed.

The ſame writer adds, that, in the above diſtrict, he has ſeen the ſide of a hill watered with rain-water, from a road running along the top of it: the ſame trench, in this caſe, acting as float and drain, running a zig-zag along the face of the ſlope, the lower folds catching the water ſpread out by the upper; and that he has likewiſe obſerved ſeveral inſtances of ridges and furrows being watered from ſimilar ſources. In theſe caſes, whether the natural deſcent of the lands was little or great, the floats were opened upon the ridges with clods of turf cut out of the trenches, placed at diſtances proportioned to the deſcent, to check the current ſufficiently, to force the water out of the trench above, yet leaving it a ſufficient paſſage, to ſuffer it to carry down a ſupply to the parts below. He has alſo met with one or more inſtances in which ridges and furrows have been levelled at an exceſſive coſt, by paring off the turf, throwing down the ridges by hand, and replacing the turf, giving the ſurface one regular gentle deſcent; and this, notwithſtanding it is allowed by thoſe who may be ſtyled maſters in the art, that the quicker the circulation the more beneficial the effect. Upon the whole, it appears pretty evident, that the operation, though ſcientific, can ſeldom be rendered mechanical. Straight lines and plain ſurfaces can ſeldom be had, but at a great, and, frequently, an unneceſſary expence. The given ſituation of the ground ſhould be conſulted and maturely ſtudied before the work be ſet about. Every ſcite may be ſaid to require a different arrangement of trenches. Of courſe, no man ought to ſet about a work of ſo difficult a nature until he has ſtudied its principles, and made himſelf maſter of its theory; nor then, without the aſſiſtance of practice in himſelf, or others whom he can employ for the purpoſe.

It is conceived that to expatiate on the utility of watering graſs-lands would be a waſte of words. In ſituations where a ſufficient ſupply of water, of a fertilizing quality, can be commanded at all ſeaſons, it ranks indubitably among the higheſt claſs of improvements. Much, however, it is ſuppoſed, depends on the quality of the water; not on its colour or clearneſs, but the ſpecific quality of the ſuſpended particles. Waters, in their natural ſtate (not purified by diſtillation), more eſpecially ſpring waters, though perfectly tranſparent and pure to the eye, are as various in quality as ſoils, owing to earthy and other particles being ſuſpended in them imperceptibly to the eye, requiring the aid of chemiſtry to detect them; hence hard water, ſoft water, wholeſome waters, medicinal waters, &c. The effects of clear ſpring water have been found ſtrikingly evident in various caſes of this ſort of management in different places in this country.

But although very much depends on the quality of water for the purpoſe of meliorating graſs-lands, much alſo depends on the quantity; on having a ſufficient ſupply at all ſeaſons. With this there are, perhaps, few waters which might not be rendered beneficial to graſs-land, if thrown over it at proper ſeaſons, and in proper quantity. Without it, the benefit, it is poſſible, may not be adequate to the expence. The moſt obvious advantage of watering graſs lands, it is conceived, ariſes in a dry ſeaſon; and if the ſupply fail in ſuch ſeaſons, as frequently happens in many ſituations, the intention is in part fruſtrated; the winter and early ſpring waterings being in this caſe all that can be commanded for the purpoſe. This is given by way of caution; not as a diſcouragement to the practice. There are, it is well obſerved, in this iſland, ſituations innumerable, in which the advantages ariſing from the practice, properly conducted, would far exceed the expence of obtaining them; and to aſcertain them is an object of the firſt magnitude to the owners and occupiers of graſs-lands, and in many inſtances, probably in thoſe of the arable kind likewiſe.

Hence it may be ſafely concluded, that this mode of improving graſs, or other lands, where it can be had recourſe to, is of the greateſt importance, and of the moſt valuable kind; and it is probably capable of being applied in a greatly more extenſive manner than has yet been the caſe, by the perſons employed in conducting the buſineſs fully availing themſelves of the various occaſional falls of rivers, ſtreams, and, in particular ſeaſons, of canals, as in this way water may often be provided for the purpoſe of diſtributing over extenſive tracts of land that have hitherto been thought incapable of admitting of ſuch means of melioration and improvement. In other circumſtances and ſituations, by having recourſe to damming up the water, and the occaſional uſe of wooden pipes in the conveying it where neceſſary, it may be eaſily raiſed to heights ſufficient for conducting it over many elevated lands, and by ſuch means promote their vegetation and produce to a degree that cannot be eaſily calculated or conceived.

And, from what has been already done in this way, it is evident that, on heathy moors, and other mountainous tracts, it may often be applied with the proſpect of great advantage. In traverſing ſuch hills, inſtances are daily occurring of little rivulets or rills, which are inſufficient to form a regular courſe, ſpreading their waters on particular parts, and thus providing a moſt beautiful verdure; which affords ſufficient proof of what may be effected by the judicious application of water in ſuch ſituations. The ſame principles may be applied, in many ſituations, in conveying the rich liquors collected in ponds and reſervoirs about the farm yards and buildings, that are too frequently waſted by evaporation or other means, over the adjoining fields, as has been practiſed in Cheſhire by Mr. Fenna.

To this ſyſtem of improving graſs-lands, the chief objection is, the firſt expence of the work; but if it be conducted in a judicious manner, and by perſons acquainted with the buſineſs, this will ſeldom be ſo conſiderable as is commonly ſuppoſed, or form any material impediment; as the increaſe of produce, which is almoſt immediately the conſequence, will amply repay the improver. It has been objected to by ſome on the ground of cutting the land, but this is of little conſequence if additional ſupplies of food be thereby afforded for the ſupport of live ſtock, and the gradual improvement of the ſoil at the ſame time effected.

It may be ſtated that winter and ſpring are the two ſeaſons when grounds of the graſs kind are uſually irrigated or watered, as from the month of November till the beginning of March. The experience of the operator muſt, in a great meaſure, regulate this proceeding as to the length of time they ſhould remain under water. In ſome diſtricts it is the practice to allow the water to flow over the fields for ſeveral weeks together, with only the interval of a day or two occaſionally; while in others the cuſtom is to cover them alternately each other week. When froſts ſet in, the work is uſually ſuſpended; but it has been remarked, that in ſuch caſes the ſucceeding crop of graſs is leſs plentiful. As the ſpring ſeaſon advances, much leſs floating is found to be requiſite. However, in every caſe where floating is performed to advantage, the land ſhould be laid dry between every time of covering it with water.

It has been adviſed in the beginning to lay the water on in the early part of November, ſuffering it to overflow from 10 to 14 days, and then taken off; repeating the ſame proceſs in the two following months; giving in February alſo two waterings of from five to ſeven days each; and in March three, of from three to five days each, according to the ſtate of the weather, conſtantly permitting the water to continue longer upon the land in cool than warm weather; and it is likewiſe generally adviſed, that on the ſandy, gravelly, and drier kinds of lands, the water ſhould not remain ſo long at a time as in thoſe of the heavier kinds; and in the latter ſorts, Mr. Wright conſiders three weeks as long enough; but Mr. Boſwell thinks it may continue on a month, or even ſix weeks in the firſt waterings, about November, and a ſomething ſhorter time for thoſe of the former ſort of lands. Mr. Wright alſo recommends, in December and February, the land to be let dry, for the purpoſe of air for a few days, and that in February particular attention is neceſſary, not to permit the water to flow over the ground many days together, without being taken off, as there may be danger from white ſcum being formed; and by the land being left expoſed to froſt in its wet ſtate, it may be injured that way. Theſe inconveniencies, it is ſuppoſed, however, by Mr. Wright, may be avoided by taking the water off in the day, and turning it upon the lands only during the night time. But Mr. Boſwell, who has had extenſive experience in this way, does not ſeem to apprehend any danger from this circumſtance to the land.

Towards the beginning of the ſpring, as about March, and ſometimes ſooner, there is moſtly a ſufficient bite of graſs to admit the lands to be fed by ſtock. The water ſhould in this caſe be turned off for a fortnight or more, in order to give it a ſufficient degree of firmneſs before the animals are turned upon it. During the following months, it is obſerved that the graſs may be eaten cloſe, but not later; as continuing it even for a few days in May would greatly injure the hay produce which is to be obtained, both in quantity and quality. In this month, when the graſs has been fed down, the water ſhould, according to Mr. Wright, be again turned over the lands for a few days, by which they are ſo moiſtened as to produce a full crop of hay. It is not improbable but that, with leſs cloſe feeding, two crops of hay from ſuch watered lands might frequently be taken with benefit. It is remarked by this writer, that the firſt crop of hay from watered lands, when cut ſufficiently early, is equally good with that of moſt other ſorts, but that when let ſtand too long, it becomes coarſe and unfit for the purpoſe of fodder.

A late philoſophical writer has ſuggeſted, that where the flooding of lands is continued ſome time, the water ſhould only be ſuffered to trickle or flow over it gently from the higher parts, and not ſtagnate upon it; as, in the latter caſe, the graſs roots are ſoon deſtroyed in the ſpring, and that when ſuch materials begin to decay underneath the water, a white ſcum ariſes in conſequence of the air ſet at liberty by the beginning putrefaction, which has been ſuſpected as prejudicial to the graſs, but which is rather the effect than the cauſe of the miſchief, and demonſtrates that the water has remained too long in a ſtagnant ſtate upon the ground, and requires to be removed, or to have a freſh ſupply from the ſtream; but the former is probably the better practice. The neceſſity of continuing the irrigation, or watering of land, after it has been once begun in hot climates and ſeaſons, has been already ſhewn, and it is ſuggeſted that there may be injury done to the graſs plants by the ſudden application of much water under ſuch circumſtances in ſome caſes.

It is uſefully inculcated by a late writer that, before any ſerious expence is incurred in works of this kind, the nature and effects of the water that is to be employed ſhould be fully aſcertained by the eſtabliſhment of trial grounds, which, if it be proper and beneficial for the purpoſe, will be ſhewn by the ſuperiority in the growth, verdure, and general appearance of the graſs towards the latter end of March, or the beginning of the following month. The quantity of water and extent of ground that can be covered by it muſt likewiſe be jointly taken into conſideration before any improvement of this ſort can with propriety be undertaken. And in every inſtance it is adviſed that due eſtimates, and a calculation of profit, be formed on the following principles. Firſt calculating the probable advantages that may ariſe every year from hay and paſturage, and an annually increaſing ſupply of manure and dung; then taking the intereſt at ſix per centum on the eſtimated coſt of the works that may be requiſite to produce them, together with the amount of the eſtimated annual expence of labour, and neceſſary repairs.

A great number of intereſting inſtances of ſucceſsful irrigation, or application of water over lands, in the midland diſtricts, have been ſtated by the ſame author. And in this caſe, as in many others, Mr. Bakewell ſtands firſt as an improver of graſs-lands. It is ſtated that, formerly, a ſuit of meadows, lying by the banks of the Soar, received conſiderable benefit from the water of the river being ſpread over them judiciouſly in the time of floods. But now, not only theſe meadows, but near an hundred acres, he believes, of higher lands lying entirely out of the way of natural floods, are watered on the modern principle.

And it is remarked that the ingenious improver juſt noticed, like a man of experience in buſineſs, before he ſet about this great work, ſtudied the art in the principal ſcene of practice, the weſt of England, where he ſpent ſome days with the ingenious Mr. Boſwell, who, not many years ago, publiſhed a treatiſe on the ſubject. And that the great ſtroke of management in this department of his practice, which marks his genius in ſtrong characters, is that of diverting to his purpoſe a rivulet or ſmall brook, whoſe natural channel ſkirts the fartheſt boundary of his farm, falling, with a conſiderable deſcent, down a narrow valley, in which its utility, as a ſource of improvement to land, was confined. This rivulet, being turned at the higheſt place that could be commanded, and carried, in the canal manner, round the point of a ſwell, which lies between its natural bed and the farmery: by the execution of this admirable thought, not only commanding the ſkirts of the hill, as a ſeite of improvement by watering; but ſupplying, by this artificial brook, the houſe and farm-offices with water: filling, from it, a drinking-pool, for horſes and cattle; a waſh-pool, for ſheep; and converting it into a multitude of other purpoſes: acquiſitions which, Mr. Marſhall ſays, many other ſituations in the iſland are capable of affording. One of theſe purpoſes is worthy of being mentioned as deſerving the attention of the practical farmer. After endeavouring to invent a flat-bottomed boat or barge, to navigate upon this canal; for the purpoſe, moſt particularly, of conveying his turnips from the field to the cattle-ſheds; and finding it not eaſily practicable, his great mind ſtruck out, or rather caught, the beautifully ſimple idea of launching the turnips themſelves into the water; and letting them flow down ſingly with the current. "We throw them in," ſays he, "and bid them meet us at the barn's end!" in which ſituation he was then (October, 1789) contriving a reſervoir, or dry dock, for them to fall into: with a grate at the bottom, to let out the water, and retain the turnips; which will there be laid up, clean waſhed and freight-free, as a ſupply in froſty weather.

The improvements effected in this department of rural affairs, by this able improver, are, it is obſerved, not only extenſive, but highly intereſting, and are rendered the more ſtriking, by "proof pieces," (a good term for experimental patches,) left in each ſeite of improvement.

In the art of irrigating or watering graſs-lands, on the modern principle, Mr. Paget, of Ibſtock, is alſo mentioned. This improver, it is ſtated, cuts a conſiderable quantity of hay, annually, from lands which have received no other manure than water, during the laſt forty years. A ſtriking inſtance, it is ſuppoſed, that water is not merely a ſtimulus or force, as ſome men conceive it to be, but communicates ſome real nutriment to the herbage or graſs plants. In the practice of this improver, one circumſtance occurred, which ought to be mentioned by way of caution. He found that in watering an orchard with the waſhings of the ſtreet and yards of a neighbouring village (a deſirable ſpecies of water) the fruit-trees were greatly injured. A ſimilar circumſtance alſo took place in the practice of Mr. Bakewell. It is well known that ſurface water is in all circumſtances highly injurious to fruit-trees of the apple kind. Alſo, near Appleby, in Yorkſhire, Mr. Moor has executed a conſiderable work of this kind in a judicious manner, cutting a freſh channel on one ſide of the ſeite of improvement, for a rivulet which wound through its middle; in order to prevent its overflowing at an improper ſeaſon; and converting the old channel, (partially filled up) into a main float; an expedient which may be frequently practiſed with good effect, in different ſituations. The ſame ſpecies of improvement has likewiſe been carried on with much ſpirit and ſucceſs by Mr. Wilks of Meeſham; and in other inſtances the practice has not been attended with leſs ſucceſs, though under different circumſtances.

According to the agricultural ſurvey of the county of Devon, Mr. Templer, of Stover, has experienced from this method of huſbandry very conſiderable beneficial effects on a tract of marſhy land on the borders of his canal. It had formerly produced from five to ten ſhillings an acre. After having it drained and levelled, by forming conductors for the overplus water of the canal during the winter floods, and diſtributing it by well arranged ſluices, ſo as to throw the enriching particles upon the ſurface, he converted theſe marſhes into valuable, verdant meadow-land. The method that was adopted in conſtructing the diſtributing ſluices was by having a number of trunks placed at various diſtances, to each of which a plug was fitted, and when the flood ſwelled the canal above the level requiſite for navigation, the plugs were taken out, and the water immediately overflowed the ſurface of the meadow-lands, being at any time capable of being eaſily reſtrained by replacing the plugs: ſimilar ſucceſs is likewiſe aſſerted to have attended a like proceſs on lands in the upper line of the canal.

Beſides theſe, in Yorkſhire, Cheſhire, Wales, and the more northern parts of Scotland, as well as in the different diſtricts in which the practice of irrigation has been long common, various improvements have been effected by the application of water to the ſurface of graſs-lands, which will be particularly noticed under the proper head, and alſo the moſt approved methods of accompliſhing the buſineſs under different circumſtances of ſoil and ſituation. See *Watering of* LAND.

IRRITABILITY, in *Phyſiology*, denotes, in its moſt general ſenſe, the capability of being irritated or excited, or that property by which living parts are enabled to execute their functions: when thus employed, it is ſynonymous with excitability, and may be regarded as denoting the moſt characteriſtic peculiarity of living matter. It is very commonly employed, in a more limited acceptation, to expreſs the property by which muſcles are enabled to contract, either in obedience to the will, or to any mechanical or chemical ſtimuli. In either caſe, this word is to be underſtood as ſignifying merely a property of living bodies, the real nature of which is as entirely unknown to us as that of attraction or chemical affinity. All the ſpeculations which have been entertained on the ſubject of its nature, ſuppoſing it to be a peculiar ſubtle matter like thoſe (whoſe exiſtence, be it obſerved, reſts alſo on ſuppoſition) of electricity common or Voltaic, of magnetiſm or light, or conſidering it as identical with oxygen, may be diſmiſſed without any formal refutation, as they are completely gratuitous aſſumptions. See LIFE, MUSCLE, and NERVE.

IRRITATION, in *Medicine*, ſignifies a ſtate of feveriſhneſs and inquietude, in which the functions are impeded, and the ſtrength gradually impaired, ariſing either from internal or external cauſes, but principally from the former. It is ſynonymous with the *erethiſm*, ἐρεθισμὸς, of the Greek writers. Irritation is produced, in different inſtances, by extraneous ſubſtances in the cavities or organs of the body, as calculi in the bladder, kidnies, or ureters; worms in the ſtomach or inteſtines, &c.; or by chronic diſeaſe in the viſcera, ſuch as ſcirrhus of the liver, of the meſenteric glands, &c.; or ſlow inflammation in any part; or by the prevalence of any depreſſing paſſion, as grief and anxiety; or by long watching; and various other cauſes. In febrile diſeaſes, from whatever origin, a ſtate of irritation is more readily produced; *i. e.* the ſame ſtimuli which excite little effect in the ſtate of health, tend to aggravate the feveriſh ſymptoms, ſuch as external heat, ſtrong light, noiſes, muſcular or mental exertion, and the like: whence, in every fever, whether idiopathic or ſymptomatic, the removal of every ſource of irritation is an indication conſtantly to be kept in view.

IRRSUMIT, in *Geography*, a town of Eaſt Greenland. N. lat. 61° 10′. W. long. 45° 35′.

IRSOA, a ſmall iſland near the coaſt of Portugal, on the ſouth ſide of the mouth of the Minho. N. lat. 41° 50′. W. long. 8° 36′.

IRTISCH, or IRTYSH, a river of Ruſſia, which riſes in the Chineſe Soongoria, flows through the lake Norſniſan, in N. lat. 46° 30′, then enters the Ruſſian territory, and after meandering through a large tract of country, throws itſelf, in N. lat 61°, and E. long. 56′, into the Oby. In its way it takes up ſeveral ſmaller rivers, and forms ſeveral iſlands, of which ſome occaſionally diſappear, and their places are ſupplied by others; and the intervals in which it is navigable are perpetually changing. Its water in the inferior regions is whitiſh and light, ſo that it ſhould ſeem to flow over a bottom conſiſting chiefly of calcareous marle. It ſwarms with fiſh, and its ſturgeons have a peculiar delicate flavour.

IRVINE, or IREWINE, a ſea-port town and royal borough in the bailiwick of Cunningham, and county of Ayr, Scotland, is ſeated on the northern bank of the river Irvine, the eſtuary of which forms the harbour. On the ſouthern ſide of the river is a row of houſes uniformly built; and theſe, with others, are hamlets to the pariſh of Dundonald. The town appears to have been chartered at an early period; for in a grant from Alexander II., reference is made to previous charters. The magiſtracy of this town had formerly extenſive juriſdiction, but this has been abridged; but it ſtill derives an ample revenue from a large tract of land near the town. Here is a commodious harbour, which has 10 or 12 feet of water on the bar at ſpring-tides. Several veſſels, called buſſes, were formerly employed in the herring-fiſhery: at preſent the coal-trade is the chief object with the inhabitants. Above 24,000 tons have been ſhipped from this port in one year. Attached to the town is a dock-yard for ſhip-building, a large tan-yard, rope-ground, and a bleach-field. Many of the inhabitants are alſo engaged in the manufactory of carpets, muſlins, ſilks, lawns, and other articles. In the year 1800, the town contained 729 houſes, and 4584 inhabitants; though its population was eſtimated, in 1790, at 3500. The town is 61 miles W. by S. from Edinburgh. The church is deſcribed as a prominent object of beauty and intereſt in the town. Bowtree hill, in the vicinity of Irvine, is a ſeat of the honourable Mr. Hamilton; and near it is an old caſtle, belonging to the earl of Eglingtown, who has a ſeat in the neighbouring pariſh of Kilwining. In the pariſh of Irvine it is ſaid that a religious ſect called Buchannites, from the name of the founder, had its origin. Sinclair's Statiſtical Account of Scotland, vol. vii. p. 169, &c. by the Rev. James Richmond.

ISA, in *Hindu Mythology*, one of the thouſand names of Siva, the perſonification of the deſtructive or regenerative power of the deity. (See SIVA.) With the epithet *Maha*, or *great*, prefixed, Maheſa is formed, another of Siva's names. In this form, the name of his conſort or ſakti (ſee SAKTI) is Iſi. Under theſe names ſir William Jones recognizes the Oſiris and Iſis of Egypt. Iſwara ſeems but another mode of writing and pronouncing Iſa; and the deduction of Oſiris from that ſound is no ſtrained etymology, eſpecially when confirmed by many hiſtorical and characteriſtic coincidences. Iſa and Iſi are both perſonifications of the moon; for with the Hindus, that luminary is both male and female: and here we find Parvati (of whom Iſi is only another form and name) again correſponding with the Diana of the Greeks, one of whoſe names is Luna.

ISAAC, in *Scripture Biography*, the ſon of Abraham and Sarah, was born at Gerar, in the country of the Philiſtines, B.C. 1896, when his father was 100, and his mother 90 years of age. His birth was previouſly announced to Abraham, as the ſon of covenant and promiſe, in whoſe ſeed all the nations of the earth ſhould be bleſſed. His name, according to its Hebrew etymology, which denotes "he has laughed, or ſhall laugh," expreſſes the pleaſure with which his parents received the prediction of his birth, and augured the honour that awaited his poſterity. A circumſtance, however, occurred, which tended to abate their joy; and this was a divine command to offer Iſaac as a ſacrifice. (See ABRAHAM.) At the age of 40 years, Iſaac married Rebecca, the daughter of Nahor, Abraham's brother; and by her he had two twin-ſons, Eſau and Jacob. (See their articles.) This venerable patriarch, for whoſe hiſtory we refer to the book of Geneſis, ch. xviii—xxxv. died at the age of 180 years, B.C. 1716, and was buried with his parents in the cave of Machpelah.

ISAAC I. COMNENUS, in *Biography*, emperor of the Eaſt, ſon of Manuel, was the firſt of the noble family of Comneni who arrived at the imperial throne. Iſaac and his brother John were bequeathed by an affectionate father, conſcious of his own deſerts in the ſervice of his country, to the gratitude and favour of his ſovereign. The noble youths were carefully trained in the learning of the times, the arts of the palace, and the exerciſes of the camp; and had become extremely popular with the people and the army. On the elevation of Michael VI., the diſcontent of the ſoldiery was openly manifeſted. The generals, who conſidered themſelves inſulted by the election of Michael, ſecretly aſſembled in the ſanctuary of St. Sophia, and would have choſen the venerable and valiant Catacalon, if the modeſty of the veteran had not ſuggeſted the importance of birth as well as merit in the choice of a ſovereign. Upon his refuſal of the dignity, Iſaac Comnenus was approved by general conſent. Comnenus, then in Paphlagonia, ſoon learnt the deciſion of the military ſynod; and inveſted with the imperial enſigns, marched to Nice, which he took by ſurpriſe; but being encountered in the neighbourhood of that city by Michael's generals, he entirely defeated them, and proceeded to Conſtantinople. The dethroned emperor reſigned his dignity, and retired to a monaſtery; and Iſaac was ſolemnly crowned, September 1, 1057. His ſhort reign was undiſturbed by foreign enemies: he fell into a declining ſtate of health, which he took as an admonition to retire from the world. John, whom he would gladly have inveſted with the imperial purple, refuſed to accept the toil, and it was conferred upon Conſtantine Ducas; and Iſaac ended his reign of two years and three months in a monaſtery. Iſaac in a great meaſure recovered his health, and ſurvived two years his voluntary abdication. At the command of his abbot, he obſerved the rule of St. Baſil, and executed the moſt ſervile offices of the convent; but he was gratified by the frequent and reſpectful viſits of the reigning monarch, who revered in his perſon the character of a benefactor and ſaint. Gibbon. Univer. Hiſt.

Isaac II. Angelus, emperor of the Eaſt, was raiſed to that dignity by the fall of Andronicus, the laſt of the Comnenian family who reigned at Conſtantinople. The revolution which hurled him from the throne, ſaved and exalted Iſaac Angelus, who deſcended by the female line from the ſame imperial dynaſty. "The ſucceſſor of a ſecond Nero," ſays the hiſtorian, "might have found it an eaſy taſk to deſerve the eſteem and affection of his ſubjects; nevertheleſs they ſometimes had reaſon to regret the adminiſtration of Andronicus." Iſaac abandoned himſelf to frivolous amuſements and luxurious indulgences, and oppreſſed his people by the laviſh expences of his houſehold. "Iſaac," ſays Mr. Gibbon, "ſlept on the throne, and was awakened only by the ſound of pleaſure: his vacant hours were amuſed by comedians and buffoons, and even to theſe the emperor was an object of contempt: his feaſts and buildings exceeded the examples of royal luxury; the number of his eunuchs and domeſtics amounted to twenty thouſand." His generals were ſucceſsful in expelling the Sicilian invaders; but Iſaac diſgraced himſelf by the cruelty with which he treated the captives. Conſtantinople was beſieged, and the weak emperor put all his truſt in an image of the Virgin Mary, and the prayers of the monks. A revolt of the Bulgarians proved a laſting injury to the empire; and it became neceſſary to ſuffer them to eſtabliſh an independent kingdom. Iſaac drew upon himſelf various acts of hoſtility from Frederic Barbaroſſa, who was the friend and ally of the Cruſaders. At length the perfidy of his own brother Alexius was more fatal to him than foreign violence. In 1195, he ſeized upon the throne, during the abſence of Iſaac on a hunting party; and obtaining poſſeſſion of his perſon, deprived him of his ſight, and ſhut him up in a loneſome priſon. His ſon Alexius eſcaped, and engaged the weſtern powers in his behalf; who, in 1203, took Conſtantinople, and replaced Iſaac upon the throne in conjunction with his ſon. Another revolution, in 1204, effected by Alexius Ducas, deprived them of their ſeat; and the death of Iſaac very ſoon followed, or perhaps preceded, the murder of his ſon. Univer. Hiſt. Gibbon.

Isaac, Henry, a German compoſer of great renown in Italy, during the fifteenth century, under the name of Arrigo Tedeſco; by which title he is celebrated by Politian. Quadrio, tom. ii. p. 321. ſays that he was maeſtro di cappella of the church of San Giovanni, in Florence; and the firſt who, in different ballad-airs, ſet the ſongs of Lorenzo il Magnifico, in three parts, for a proceſſional maſquerade. He flouriſhed about 1475. Glareanus, in his "Dodecachordon," ſays that "Henry Iſaac chiefly cultivated the church ſtyle; and in his works may be perceived a natural force and majeſty, ſuperior, in general, to any thing that can be found in the compoſitions of our times; though his ſtyle may be ſaid to be ſomewhat rough. He was fond of long notes in ſome one of his middle parts, while the reſt of the voices were in a manner playing round it, as the wind plays when it puts the waves in motion round a rock."

ISABAD, in *Geography*, a town of Perſia, in the province of Irac; 50 miles S. of Hamadan.

ISABE, a town of Japan, in the iſland of Niphon; 50 miles N.W. of Jedo.

ISABEL, St., one of the iſlands of Solomon, in the Pacific ocean, 200 miles in circumference, S. lat. 7° 30′, about 160 leagues weſt of Lima, diſcovered by Mendana in 1567. The inhabitants are cannibals, and worſhip ſerpents, toads, and other animals. Their complexion is brown, their hair woolly, and they wear no covering but round their waiſt. They are divided into tribes, and are conſtantly at war with each other.

ISABELLA, in *Biography*, queen of Caſtile, born in 1451, was the daughter of John II. She paſſed the early part of her life in great obſcurity, and without any proſpect of a crown; but the Caſtilians having conſpired againſt her brother Henry IV., obliged him to declare Iſabella heireſs to the kingdom. In 1469 ſhe married Ferdinand king of Arragon; and upon the death of Henry in 1474, they were conjointly declared king and queen of Caſtile. They were proclaimed at Segovia, amidſt loud acclamations; and the fidelity of their new ſubjects enabled them to defeat all the deſigns of their enemies, who had declared in behalf of Joanna, the ſuppoſed daughter of Henry. Alphonſo IV. king of Portugal, eſpouſed the perſon and the cauſe of the latter, and took up arms in her defence and his own. The defeat at the battle of Toro, in 1475, was fatal to his pretenſions; and by a peace concluded in 1479, the right of Iſabella and her huſband was fully acknowledged, and Joanna retired into a monaſtery. In this ſame year, the crown of Arragon fell to Ferdinand; and from that period the kingdoms of Caſtile and Arragon were inſeparably united, compriſing the whole of Spain not poſſeſſed by the Moors. (See Ferdinand.) Religious zeal was a leading feature in her character; and the deſire of propagating the Chriſtian faith in parts of the world where it was yet unknown, was the chief motive of the encouragement ſhe gave to the projects of Columbus which eventually added ſo much to the Spaniſh monarchy. Her merits towards the church were rewarded by the title of "The Catholic," conferred by Innocent VIII. on both the royal partners, and their ſucceſſors in the Spaniſh crown. Iſabella died with the great regret of her ſubjects, in November 1504, in the 54th year of her age. Univer. Hiſt. Robertſon's Hiſt. of America.

Isabella, in *Conchyliology*, the name given by the French naturaliſts to the beautiful pale-brown voluta, ſo much eſteemed in the Dutch cabinets.

ISABELLA, in *Geography*, a ſmall iſland near the coaſt of Braſil; 25 miles S.W. from the mouth of the river St. Franciſco.—Alſo, a town on the north coaſt of the iſland Hiſpaniola, built by Chriſtopher Columbus in the year 1493. N. lat. 19° 55′. W. long. 71° 0′. Iſabella Point forms the N.E. ſide of the bay of the ſame name. Here Columbus formed the firſt Spaniſh ſettlement, naming it after his patroneſs queen Iſabella. He was driven hither by a tempeſt in the night.

ISABELLA, *St.*, a town of Braſil, in the government of St. Salvador, near the coaſt. S. lat. 11° 10′.

ISACHNE, in *Botany*, from ισος, *equal*, and αχνη, *a huſk*. Brown. Prodr. Nov. Holl. v. 1. 196. Claſs and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Eſſ. Ch. Calyx of two equal, membranous, obtuſe valves, two-flowered. Florets equal, bivalve, of a paper-like texture; the outer male, inner female. Two ſcales beneath the germen. Stigmas feathery. Seed encloſed in the hardened calyx. *Brown.*

A genus of ſmooth graſſes, growing in watery places. *Leaves* flat, their ſheaths bearded at the top. *Flowers* panicled.—They have great affinity to *Panicum*, and the aſpect of *P. coloratum*. It appears by Hermann's herbarium that his *Meneritana*, Fl. Zeyl. 24, is of this genus.

The only New Holland ſpecies given by Mr. Brown is

I. *auſtralis.* "Panicle lanceolate, ſimple. Branches and flower-ſtalks zig-zag. Stem erect." Native of Port Jackſon, New South Wales.

ISÆUS, in *Biography*, an orator of Chalcis, in Eubœa, who flouriſhed about the end of the Peloponneſian war, the fourth century before the Chriſtian era. When he came to Athens, he put himſelf under the inſtructions of the orator Lyſias, from whom he obtained the ſame purity, accuracy, conciſeneſs and perſpicuity of ſtyle, which diſtinguiſhed his maſter, with more force and vigour. He was celebrated for popular eloquence, and had the honour of being the inſtructor of Demoſthenes. It has been ſaid that he was diſſipated in early life, but that as he attained to years of maturity, he became illuſtrious by the practice of the oppoſite virtues. He lived to the time of king Philip. He was author of ſixty-four orations, of which ten only are now remaining, which are to be found among the Oratores veteres Græci. Theſe have been tranſlated by ſir William Jones, and were given to the world in 1779. There was another Greek orator of this name, who came to Rome in the firſt century of the Chriſtian era, and who is mentioned with great applauſe by Pliny the younger, who obſerves that he always ſpoke extempore, and wrote with elegance, unlaboured eaſe, and great correctneſs.

ISAGO, in *Geography*, a country of Africa, N.W. of Benin.

ISAGON, in *Geometry*, is ſometimes uſed for a figure conſiſting of equal angles.

ISAIAH, *or the Prophecy of Iſaiah*, a canonical book of the Old Teſtament. Iſaiah is the firſt of the four greater prophets; the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother, as ſome have ſaid, to Azariah, or Uzziah, king of Judah.

The firſt appointment of Iſaiah to the exerciſe of the prophetical office is ſuppoſed to have taken place in the laſt year of Uzziah's reign, or 758 B C., at which time he is ſuppoſed to have been about 25 years of age; and if he lived to the reign of Manaſſeh B C. 696, by whoſe order, according to a tradition of the Jews, he was ſawn aſunder, the duration of his office muſt have extended to 61 or 62 years. But this Jewiſh tradition is uncertain; and one of their principal rabbins (Aben Ezra, Com. in Iſ. i. 1.) ſeems rather to think that he died before Hezekiah, which opinion is received as the moſt probable. It is certain, however, that he lived at leaſt to the 15th or 16th year of Hezekiah; and this makes the leaſt poſſible term of the duration of his prophetical office, about 47 or 48 years; ſo that he propheſied in the reigns of Uzziah, Jotham, Ahaz, and Hezekiah. The time of the delivery of ſome of the prophecies is either expreſsly marked in, or eaſily deducible from, the hiſtory to which they relate; that of a few others may, with ſome probability, be inferred from expreſſions, deſcriptions, and circumſtances interwoven in the predictions themſelves. The prophecy contained in the firſt chapter ſtands ſingle and unconnected; and contains a ſevere remonſtrance againſt the corruptions prevailing among the Jews of that time; powerful exhortations to repentance; grievous threatenings to the impenitent; and gracious promiſes of better times, when the nation ſhall have been reformed by the juſt judgments of God. The expreſſion is upon the whole clear; the connection of the ſeveral parts eaſy; and in regard to the images, ſentiments, and ſtyle, it gives a beautiful example of the prophet's elegant manner of writing; though perhaps it may not be equal in theſe reſpects to many of the following prophecies. The prophecy contained in the ſecond, third, and fourth chapters, makes one continued diſcourſe. The firſt five verſes of the ſecond chapter foretel the kingdom of the Meſſiah, the converſion of the Gentiles, and their admiſſion into it. From the 6th verſe to the end of the 2d chapter, is foretold the puniſhment of the unbelieving Jews for their idolatrous practices, their ſelf-confidence and diſtruſt of God's protection; and moreover the deſtruction of idolatry, in conſequence of the eſtabliſhment of Meſſiah's kingdom. The whole third chapter, with the firſt verſe of the fourth, is a prophecy of the calamities of the Babylonian invaſion and captivity; with a particular amplification of the diſtreſs of the proud and luxurious daughter of Sion. Chapter iv. 2—6, promiſes to the remnant, which ſhall have eſcaped this ſevere purgation, a future reſtoration to the favour and protection of God. The prophecy was probably delivered in the time of Jotham, or perhaps in that of Uzziah. The 5th chapter is unconnected with that which precedes, and with that which follows it; and the ſubject of it, like that of the firſt chapter, is a general reproof of the Jews for their wickedneſs; but it exceeds that chapter in force, in ſeverity, in variety, and in elegance; and it adds a more expreſs declaration of vengeance, by the Babylonian invaſion. The viſion in the 6th chapter ſeems to contain a ſolemn deſignation of Iſaiah to the prophetical office, and it is therefore thought by moſt interpreters to be the firſt in order of his prophecies. Biſhop Lowth, however, conjectures that this may not be the caſe; becauſe Iſaiah is ſaid to have propheſied in the time of Uzziah; but as Iſaiah's prophecies are not placed in exact order of time, the 2d, 3d, 4th, and 5th chapters ſeem to be antecedent to the 1ſt chapter, and to ſuit the time of Uzziah, or the former part of Jotham's reign, whereas the 1ſt chapter can hardly be earlier than the laſt years of Jotham. Accordingly this might be a new deſignation, to introduce more ſolemnly a general declaration of the whole courſe of God's diſpenſations in regard to his people, and the fates of the nation; which are even now ſtill depending, and will not be fully accompliſhed till the final reſtoration of Iſrael. The 7th chapter begins with an hiſtorical account of the occaſion of this prophecy; and then follows a prediction of the ill ſucceſs of the deſigns of the Iſraelites and Syrians againſt Judah; and a denunciation of the calamities to be brought upon the king and people of Judah by the Aſſyrians, whom they had now hired to aſſiſt them. The 8th chapter is cloſely connected with the foregoing, and contains a confirmation of the prophecy before given of the approaching deſtruction of the kingdoms of Iſrael and Syria by the Aſſyrians, of the denunciation of the invaſion of Judah by the ſame Aſſyrians; together with a repeated general aſſurance, that all the deſigns of the enemies of God's people ſhall be in the end diſappointed and brought to nought, concluding, after admonitions and threatenings, with an illuſtrious prophecy of the manifeſtation of the Meſſiah, the tranſcendent dignity of his character, and the univerſality and eternal duration of his kingdom. This prophecy concludes at the 6th verſe of the 9th chapter. The whole paſſage from chapter ix. 7. to chapter x. 4, contains a diſtinct prophecy, and a juſt poem; remarkable for the regularity of its diſpoſition and the elegance of its plan; it is addreſſed excluſively to the kingdom of Iſrael, and the ſubject of it is a denunciation of vengeance awaiting their enemies. The 5th verſe of the 10th chapter begins with a new and diſtinct prophecy, which is continued to the end of the 12th chapter. It appears that it was delivered after the taking of Samaria by Shalmaneſer, in the 6th year of the reign of Hezekiah, and as the former part of it foretels the invaſion of Senacherib, and the deſtruction of his army, which makes the whole ſubject of this chapter, it muſt have been delivered before the 14th year of the ſame reign. Then, according to Iſaiah's uſual method, he takes occaſion, from the mention of a great temporal deliverance by the deſtruction of the Aſſyrian army, to launch out into the diſplay of the ſpiritual deliverance of God's people by the Meſſiah, to whom this prophecy relates. (See Rom. xv. 12.) The hymn in the 12th chapter ſeems, by its whole tenor, as well as by many expreſſions in it, much better calculated for the uſe of the Chriſtian church, than for the Jewiſh in any circumſtances, or at any time, that can be aſſigned; and the Jews themſelves ſeem to have applied it to the times of the Meſſiah. The 13th and 14th chapters (excluding the five laſt verſes of the latter, which belong to a quite different ſubject) contain one entire prophecy, foretelling the deſtruction of Babylon by the Medes and Perſians; delivered probably in the reign of Ahaz (ſee Vitringa, i. 380.) about 200 years before the completion of it. The former part of this prophecy, ſays biſhop Lowth, is one of the moſt beautiful examples, that can be given, of elegance of compoſition, variety of imagery, and ſublimity of ſentiment and diction in the prophetic ſtyle; and the latter part conſiſts of an ode of ſupreme and ſingular excellence. The 15th and 16th chapters, which ought not to have been ſeparated, taken together, make one entire prophecy, delivered, moſt probably, ſoon after the foregoing, in the 1ſt year of Hezekiah, and accompliſhed in his 4th year, when Shalmaneſer invaded the kingdom of Iſrael. The prophecy in the 17th chapter comprehends the kingdom of Samaria and the Iſraelites, confederated with Damaſcus and the Syrians againſt the kingdom of Judah. It was delivered probably ſoon after the prophecies of the 7th and 8th chapters, in the beginning of the reign of Ahaz, and was fulfilled by Tiglath-Pileſer's taking Damaſcus, (2 Kings, xvi. 9.) overrunning a great part of the kingdom of Iſrael, and carrying a great number of the Iſraelites alſo captives to Aſſyria; and ſtill more fully in regard to Iſrael, by the conqueſt of the kingdom, and the captivity of the people, effected a few years after by Shalmaneſer. The prophecy in the 18th chapter is in all its circumſtances obſcure and doubtful. In the 19th chapter the prophet ſeems to have had in view the conqueſt of the Perſians by Alexander, which was in fact a deliverance to Egypt, together with other preceding and collateral incidents, and the favour granted to the Jews by Alexander and the Ptolemies. The 20th chapter refers to the taking of Aſhdod or Azotus, and warns the Jews againſt depending too much on the aſſiſtance of Egypt. The ten firſt verſes of the 21ſt chapter contain a prediction of the capture of Babylon by the Medes and Perſians; the remaining prediction is obſcure. The prophecy, ending with the 14th verſe of the 22d chapter, foretels the invaſion of Jeruſalem by the Aſſyrians under Senacherib, or by the Chaldæans under Nebuchadnezzar. Vitringa thinks that the prophet had both in view; that of the Chaldæans in the firſt part, verſe 1—5, and that of the Aſſyrians in the latter part, v. 8—11. The prophecy in the 23d chapter denounceth the deſtruction of Tyre by Nebuchadnezzar. From the 13th chapter to the 23d incluſive, the fate of ſeveral cities and nations is denounced; of Babylon, of the Philiſtines, Moab, Damaſcus, Egypt, Tyre. The prophet then proceeds, in the 24th and three following chapters, to declare the judgments impending upon the people of God themſelves, for their wickedneſs and apoſtacy; and the deſolation that ſhall be brought on their whole country. The particular ſubject of the 24th chapter has been differently aſſigned by interpreters; ſome refer it to the deſolation occaſioned by the invaſion of Shalmaneſer; others to the invaſion of Nebuchadnezzar; and others to the deſtruction of the city and nation by the Romans. Vitringa is ſingular in referring it to the perſecution of Antiochus Epiphanes. Biſhop Lowth thinks it may have a view to all the three great deſolations of the country by Shalmaneſer, by Nebuchadnezzar, and by the Romans, eſpecially the laſt. The 25th chapter contains a ſong of praiſe, dictated more by the proſpect of future mercies, than by the recollection of paſt events. The ſubject of the 27th chapter ſeems to be the nature, the meaſure, and the deſign of God's dealings with his people. The prophecy in the 28th chapter, as far as the fifth verſe, relates to the Iſraelites, and manifeſtly denounces their deſtruction by Shalmaneſer. It then turns to the two tribes of Judah and Benjamin, the remnant of God's people, who were to continue a kingdom after the final captivity of the Iſraelites. It begins with a favourable prognoſtication of their affairs under Hezekiah; but ſoon changes to reproofs and threatenings, for their intemperance, diſobedience, and profaneneſs. The ſubject of the 29th and four following chapters is the invaſion of Senacherib; the great diſtreſs of the Jews while it continued; their unexpected and ſudden deliverance by God's interpoſition in their favour; the ſubſequent proſperous ſtate of the kingdom under Hezekiah; interſperſed with reproofs and threatenings, and alſo with promiſes of better times. The 34th and 35th chapters make one diſtinct prophecy; an entire, regular, and beautiful poem, conſiſting of two parts; the firſt containing a denunciation of divine vengeance againſt the enemies of the people, or church of God: the ſecond deſcribing the flouriſhing ſtate of the church of God, conſequent upon the execution of thoſe judgments. The 36th chapter contains a hiſtory of the invaſion of Senacherib, and of the miraculous deſtruction of his army, as a proper introduction to the prophecy in the 37th chapter, which is the anſwer of God to Hezekiah's prayer, which could not be well underſtood without it. The narration of the 38th and 39th chapters ſeems to be in ſome parts an abridgment of that of 2 Kings, xx. The courſe of prophecies which follow from the 40th chapter to the end of the book, and which, taken together, conſtitute the moſt elegant part of the writings of the Old Teſtament, interſperſed alſo with many paſſages of the higheſt ſublimity, was probably delivered in the latter part of the reign of Hezekiah. They are chiefly of the conſolatory kind; and therefore they are opened with the promiſe of the reſtoration of the kingdom, and the return of the people from their captivity, by the merciful interpoſition of God in their favour. The prophet, however, extends their views to the fulfilment of God's promiſes of eſtabliſhing a more glorious and an everlaſting kingdom, under the Meſſiah to be born of the tribe of Judah, and of the family of David. He connects theſe two events together, and hardly ever treats of the former without throwing in ſome intimations of the latter.

Iſaiah has been, with peculiar propriety, denominated the "evangelical prophet," on account of the number and variety of his predictions concerning the advent and character, the miniſtry and preaching, the ſufferings and death, and extenſive permanent kingdom of the Meſſiah. His predictions are, indeed, ſo explicit and determinate, as well as ſo numerous, that no one can be at a loſs in applying them to the miſſion and character of Chriſt, and the events that are cited in his hiſtory by the New Teſtament writers. The whole book of Iſaiah, ſome few paſſages excepted, which, if brought together, would not at moſt exceed the bulk of five or ſix chapters, is conſidered by biſhop Lowth as poetical (See the article *Prophetic* POETRY.) "He abounds," ſays this learned critic, "in ſuch tranſcendent excellencies, that he may be properly ſaid to afford the moſt perfect model of the prophetic poetry. He is at once elegant and ſublime, forcible and ornamented; he unites energy with copiouſneſs, and dignity with variety. In his ſentiments there is uncommon elevation and majeſty; in his imagery the utmoſt propriety, elegance, dignity, and diverſity; in his language uncommon beauty and energy; and, notwithſtanding the obſcurity of his ſubjects, a ſurpriſing degree of clearneſs and ſimplicity. To theſe we may add, there is ſuch ſweetneſs in the poetical compoſition of his ſentences, whether it proceed from art or genius, that if the Hebrew poetry at preſent is poſſeſſed of any remains of its native grace and harmony, we ſhall chiefly find them in the writings of Iſaiah: ſo that the ſaying of Ezekiel (xxviii. 12.) may moſt juſtly be applied to this prophet:

"Thou art the confirmed exemplar of meaſures,
Full of wiſdom, and perfect in beauty."

Iſaiah greatly excels, too, in all the graces of method, order, connection, and arrangement; though in aſſerting this we muſt not forget the nature of the prophetic impulſe, which bears away the mind with irreſiſtible violence, and frequently in rapid tranſitions from near to remote objects, from human to divine: we muſt alſo be careful in remarking the limits of particular predictions, ſince, as they are now extant, they are often improperly connected, without any marks of diſcrimination, which injudicious arrangement, on ſome occaſions, creates almoſt inſuperable difficulties." Biſhop Lowth has ſelected as a ſpecimen of the kind of poetry in the language of which Iſaiah delivers his prophecies, the prediction contained in the thirty-fourth and thirty-fifth chapters; and pointed out the beauties that eminently diſtinguiſh the ſimple, regular, and perfect poem, as he denominates this prophecy. The latter part of the book, commencing at the fortieth chapter, is, perhaps, ſays the ſame excellent judge, "the moſt elegant ſpecimen remaining of inſpired compoſition, and yet, in this reſpect, is attended with conſiderable difficulty. It is, in fact, a body or collection of different prophecies, nearly allied to each other as to the ſubject, which, for that reaſon, having a ſort of connection, are not to be ſeparated but with the utmoſt difficulty. The general ſubject is the reſtoration of the church. Its deliverance from captivity; the deſtruction of idolatry; the vindication of the divine power and truth; the conſolation of the Iſraelites, the divine invitation which is extended to them, their incredulity, impiety, and rejection; the calling in of the gentiles; the reſtoration of the choſen people; the glory and felicity of the church in its perfect ſtate; and the ultimate deſtruction of the wicked, are all ſet forth with a ſufficient reſpect to order and method. If we read theſe paſſages with attention, and duly regard the nature and genius of the myſtical allegory; at the ſame time remembering, that all theſe points have been frequently touched upon in other prophecies promulged at different times, we ſhall neither find any irregularity in the arrangement of the whole, nor any want of order and connection as to matter or ſentiment in the different parts. Grotius calls Iſaiah the Demoſthenes of the Hebrews, and biſhop Lowth ranks him with Homer. (See JEREMIAH.) As a commentator on this book, the learned are under great obligations to Vitringa in his excellent commentary in 2 vols. fol. Amongſt the Engliſh tranſlations, the firſt place will be allowed to biſhop Lowth for his admirable work, abounding ſo much with learned criticiſm and correct taſte, entitled "Iſaiah; a new Tranſlation, with a Preliminary Diſſertation, and Notes, critical, philological, and explanatory," firſt publiſhed in 1778, 4to. in which the author has purſued the metrical arrangement. The late Michael Dodſon, eſq. alſo publiſhed in proſe "A New Tranſlation of Iſaiah; with Notes ſupplementary to thoſe of Dr. Lowth, late Biſhop of London, and containing Remarks in many parts of his Tranſlation and Notes, by a Layman," 1790, 8vo. We have lately had a valuable tranſlation of the prophecies of Iſaiah by Dr. Stock, biſhop of Killala. See the works already cited, and Lowth's Prælectiones de Sac. Poeſ. Heb. N° xx—xxi.

ISAKLU, in *Geography*, a town of Aſiatic Turkey, in Caramania; 12 miles N.W. of Akſhehr.

ISAKOVA, a town of European Turkey, in Moldavia; 60 miles N.E. of Jaſſy.

ISAKZI, a town of European Turkey, on the Danube; 26 miles W. of Iſmail. N. lat. 45° 18'. E. long. 29° 9'.

ISAMBLUCIS, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the *ſelenitæ*, but of the columnar, not the rhomboidal kind.

The ſelenitæ of this genus conſiſt of ſix ſides, and two obtuſe or abrupt ends; and all their ſides being very nearly of the ſame breadth, they much reſemble broken pieces of the columns of ſprig-cryſtal.

The bodies of this genus, as well as the reſt of the columnar ſelenitæ, are ſubject to a longitudinal crack, which ſometimes admitting a ſmall quantity of clay, ſhapes it into the figure of an ear of graſs. Hill's Hiſt of Foſſ. p. 121. See the article SELENITES.

ISANDORA, in *Geography*, a town of Angola, on the Coenza; 25 miles S. of Loanda.

ISANI, in *Mythology*, one of the many names of the Hindoo deity, Siva; alſo of his ſakti, or conſort Parvati: it ſeems nearly ſimilar with Iſa. (See under thoſe articles.) The Hindoos reckon eight of their principal deities, as regents or ſupporters of the eight cardinal and intermediate points of the heavens. Of theſe regents, called Maruts, or *winds*, Indra is the chief, and rules the Eaſt. (See INDRA and MARUT.) Iſani or Siva, in that form, is by ſome mythologiſts, but not by all, reckoned another, and ruler of the north-eaſt. See Moor's Hindoo Pantheon, under *Indra* in the index.

ISANTHUS, in *Botany*, ſo called by Michaux, from ισος *equal*, and *ανθος, a flower*, becauſe this plant, unlike moſt others of the claſs *Didynamia*, has a regular corolla.—Michaux Amer. v 2. 3. t. 30. Claſs and order, *Didynamia Gymnoſpermia.* Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Gen. Ch. *Cal.* Perianth bell-ſhaped, rather ſpreading, cloven half way down into five, nearly equal, lanceolate ſegments; the two lower ones, eſpecially after the corolla has fallen off, more cloſe than the reſt. *Cor.* nearly equal with the calyx, almoſt regular; tube ſtraightiſh, narrowly cylindrical, limb ſomewhat wheel-ſhaped, five-cleft; each ſegment oval and ſimilar, with two ſpots at the baſe. *Stam.* Filaments four, nearly equal, a little ſhorter than the corolla, perfectly erect; anthers oblique, cloven below; cells ovate, diverging nearly at a right angle. *Piſt.* Germen ſuperior, four-cleft; ſtyle the length of the ſtamens, recurved at top; ſtigmas two, recurved and much ſpreading, linear tongue-ſhaped; the lower one rather the longeſt. *Peric.* none, except the permanent, ſpreading tube of the calyx. *Seeds* four, obovate, rugged and reticulated, connected only at their baſe, filling the calyx.

Eſſ. Ch. Calyx five-cleft. Corolla nearly equal, five-cleft. Stamens erect. Anthers with divaricated lobes.

1. I. *cæruleus.* Blue Iſanthus.—Michaux Amer. v. 2. t. 30. A native of Virginia and Carolina, in a chalky ſoil. The whole plant is rather viſcid and hairy. *Root* annual. *Stem* about a foot high, erect, round, branched. *Leaves* oppoſite, on ſhort ſtalks, ovate, acuminate, ribbed or nerved, fringed. *Flowers* of a pale blue.

We are only acquainted with this plant from the deſcription and figure of Michaux. It is without doubt very nearly allied to the *Aſperifoliæ*, though we have followed that author in referring it to the claſs *Didynamia.*

ISARIA, in *Geography*, a town of Naples, in Calabria Ultra; eight miles E. of Nicaſtro.

ISARRIA, a town of Naples, in Calabria Ultra; 11 miles S. of Squillace.

ISATIS, in *Botany*, is the Ισατις of Dioſcorides, and *Iſatis* of Pliny, but its derivation is totally unknown. *Woad.* Linn. Gen. 344. Schreb. 435. Willd. Sp. Pl. v. 3. 420. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 693. Ait. Hort. Kew. v. 2. 406. Tournef. t. 100. Juſſ. 242. Lamarck Illuſtr. t. 554. Gærtn. t. 142. Claſs and order, *Tetradynamia Siliculoſa.* Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of four, ovate, ſpreading, coloured, deciduous leaves. *Cor.* of four petals, croſs-ſhaped; petals oblong, obtuſe, ſpreading, by degrees attenuated into claws. *Stam.* Filaments ſix, ſlightly ſpreading, the length of the corolla; two of them ſhorter; anthers oblong, lateral. *Piſt.* Germen ſuperior, oblong, two-edged, compreſſed, as long as the ſhorter ſtamens; ſtyle none; ſtigma obtuſe, capitate. *Peric.* Pouch oblong, lanceolate, obtuſe, compreſſed, two-edged, of one cell, not gaping, two-valved, deciduous; the valves are boat-like, compreſſed and carinated. *Seed* ſolitary, ovate, central.

Eſſ. Ch. Pouch lanceolate, one-celled, ſingle-ſeeded, deciduous, with two boat-like valves.

1. I. *tinctoria.* Woad.—Linn. Sp. Pl. 936. Engl. Bot. t. 97. Mart. Fl. Ruſt. t. 41.—"Radical leaves crenated, ſtem-leaves arrow-ſhaped. Pouch oblong, ſmooth."—Rather a ſcarce plant in Britain, flowering in July, and found in fields. It was not originally a native of this iſland, but has become naturalized from its frequent culture for the purpoſe of dyeing blue. It is alſo a baſis for ſeveral other colours. Pliny ſays the ancient Britons ſtained their bodies with woad, but from the circumſtance of this plant having been introduced into this country from the ſhores of the Baltic, Spain, Italy, &c. Mr. Miller concludes that Weld (*Reſeda Luteola*), and not Woad, was uſed by our anceſtors for the purpoſe above related. But if the plant in queſtion can be identified with Pliny's it is undoubtedly a native. *Root* biennial. *Stem* erect, branched, furniſhed with alternate, ſomewhat ſucculent leaves; the radical ones ſtand on long foot-ſtalks, and are crenated. *Calyx* as well as the *corolla* of a yellow colour. *Seed-veſſels* dark brown. *Stem* and *leaves* occaſionally beſprinkled with a few hairs.

Linnæus enumerates three other ſpecies of *Iſatis, luſitanica, armena*, and *ægyptiaca*, the laſt of which is very properly removed by Willdenow to *Cakile* of Gærtner. Villars and Allioni mention another ſpecies under the name of *alpina.* This genus was very unaccountably placed by Linnæus in his order of *Siliquoſa*, together with *Bunias* and *Crambe*; but its near affinity to *Draba, Lepidium*, &c. in the ſhape and ſize of its pouch, ſufficiently warrant profeſſor Schreber's placing it among the *Siliculoſa.*

Isatis, in *Zoology.* See Lagopus.

ISATODES, a word uſed by Hippocrates, and ſome other of the old writers, to expreſs a greeniſh colour of the bile diſcovered in the ſtools, which reſemble the colour of the herb *iſatis*, or woad. This was eſteemed an indication of a highly depraved bile.

ISAURIA, in *Ancient Geography*, a town of Aſia Minor, near Piſidia. Its inhabitants were merely occupied in plunder, when Servilius made war upon them and conquered them. Hence he obtained the name of the "Iſaurian." Its chief town was "Iſaura," or "Iſauropolis," which were repeatedly deſtroyed and rebuilt. Under the Greek emperors, Iſauria became a conſiderable province at the expence of the neighbouring provinces. Hierocles, in his "Notitia," reckons in it 23 epiſcopal towns, and Leon-le-Sage enumerates 29.

ISBARTEH, in *Geography*, a town of Aſiatic Turkey, in Natolia, the reſidence of a Pacha; and in the fauxbourgs are four Greek churches; 92 miles S. of Kiutaja. N. lat. 37° 44′. E. long. 30° 56′.

ISBASTER, one of the ſmaller Shetland iſlands. N. lat. 60° 34′. W. long. 0° 58′.

ISCA, or Isca *Dannmoniorum*, in *Ancient Geography*, a town of Albion or England, the capital of the Dannmonii, and moſt probably Exeter.

Isca *Silurum*, the capital of the Silures, now Caerleon in Monmouthſhire. Here the ſecond legion of the Romans, which had contributed greatly to the reduction of the Silures, was placed in garriſon (as ſome antiquaries have imagined) by Julius Frontinus, to keep that people in obedience. It is certain, however, that this legion was very early and very long ſtationed at this place. Iſca Silurum was, in the time of the Romans, a city not only of great ſtrength, but alſo of great beauty and magnificence. This appears from the deſcription which is given of its ruins by Giraldus Cambrenſis, in his topography of Wales, written in the 12th century, ſoon after it had been deſtroyed and abandoned.

ISCALES, a town of Britain, in the country of the Belgæ, generally placed at Ilcheſter in Somerſetſhire.

ISCARIOTH, a place of Judea, in the tribe of Ephraim, whence Judas, who betrayed our Saviour, is ſuppoſed to have derived his ſurname.

ISCHÆMUM, in *Botany*, from ισχω, *to repreſs*, and αιμα, *blood*, becauſe it was ſuppoſed to poſſeſs the virtue of ſtopping hemorrhages from recent wounds. In this ſenſe the name was originally applied to the *Panicum ſanguinale* of Linnæus, called, for the ſame reaſon, *Sanguinaria* by ſome writers; and is now retained for a genus of graſſes, bearing ſome reſemblance to that, but the reputed virtue above-mentioned can ſcarcely be thought to have any foundation.

tion. Linn. Gen. 542. Schreb. 718. Mart. Mill. Dict. v 2. Brown. Prod. Nov. Holl. v. 1. 204. Juſſ. 30. Lamarck. Illuſtr. t. 839. Claſs and order, *Polygamia Monoecia*, or rather *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume two-flowered, of two cartilaginous nearly equal valves, ſituated tranſverſely; the *outer* almoſt ovate, tumid, cloven and acute at the top, the upper part of the back flattened, ſtriated, bordered; *inner* oblong, boat-like, pointed or awned at the top, furniſhed with a longitudinal dorſal membrane below the extremity. *Florets* ſhorter than the calyx, the outer one male, inner hermaphrodite. *Cor.* (in the hermaphrodite floret) of two thin, membranous, pellucid glumes; the *outer* ſwelling, either beardleſs or awned, cloven to the inſertion of the awn, acute; *awn* long, ſlender, bent, twiſted in the lower part; *inner* glume lanceolate, acute, its margins folded together; (in the male floret) of two rather firmer, pellucid, ſomewhat coloured glumes; the *outer* oblong, ſwelling, contracted upwards, acute, beardleſs; *inner* oblong, obtuſe, concave at the back, thinner and acute at the margin: *Nectary* in each of two ſmall, ſpatulate, abrupt, notched leaves. *Stam.* Filaments three, capillary, ſhort; anthers oblong, cloven at each end. *Piſt.* (in the hermaphrodite floret) Germen oblong; ſtyles two, capillary, erect, ſhorter than the corolla; ſtigmas oblong, feathery, ſpreading, prominent. *Peric.* none, except the unchanged calyx and corolla. *Seed* (in the hermaphrodite floret) ſolitary, oblong, linear, convex at one ſide.

Eſſ. Ch. Calyx of two valves, two-flowered, placed in pairs, laterally, on a jointed ſtalk; outer valve flattened. Corolla of two valves, ſhorter than the calyx. Stigmas feathery. One floret male, or neuter.

Linnæus defines two ſpecies only, *I. muticum*, Sp. Pl. 1487, and *I. ariſtatum*, ibid. The firſt is deſtitute of awns, and is the *Tagadi* of Rheede Hort. Mal. v. 12. 91. t. 49, found in every kind of ſoil in Malabar, but not of any particular uſe, except as a graſs in general. The *root* is perennial. *Stems* about a foot high, round, ſmooth, reed-like, leafy. *Leaves* lanceolate, pointed, broad at the baſe. *Spikes* terminal, double, ſhort, cloſe, ſhining. *I. ariſtatum*, diſtinguiſhed by its awns, was gathered by Oſbeck in China, and has narrower *leaves*.

I. *rugoſum*, Saliſ. Ic. 1. t. 1. Hort. 27.—"External barren glumes tranſverſely rugoſe; one of the fertile ones, whether male or female, awned."—Found by Koenig in the borders of rice fields in the Eaſt Indies. This is very remarkable for the ſtrong wrinkles or furrows of its glumes. Linnæus was inclined to make it a new genus by the name of *Cicadaria*. Mr. Saliſbury cultivated it in his ſtove at Chapel Allerton before 1796.

Mr. Brown in his Prodromus has added ſix new ſpecies to *Iſchæmum*, and alſo juſtly refers to this genus the *Colladoa* of Cavanilles, Ic. v. 5. 37. t. 460.

ISCHENIA, Ισχενια, in *Antiquity*, anniverſary ſports celebrated at Olympia, in memory of Iſchenus, the grandſon of Mercury and Hierea; who, in a time of famine, devoted himſelf to be a ſacrifice for his country, and was honoured with a monument near the Olympian ſtadium.

ISCHIA, in *Geography*, a volcanic iſland, ſituated at the eaſtern entrance of the gulf of Naples, about 18 miles in circuit; the ſee of a biſhop, ſuffragan of that of Naples, and containing three pariſhes, and a convent of nuns. The volcanic ſubſtances of which this iſland is internally compoſed, prove, beyond the poſſibility of doubt, ſays Spallanzani, that it owes its origin to fire. The caſtle of the city of Iſchia, as it is called, is built on a rock ſurrounded by the ſea, and a little more than a quarter of a mile in circuit. The two component ſubſtances of this rock are lava and tufa. About a mile to the weſt is a torrent of lava, called the "Arſo" or burnt ground, which is the moſt recent of any in the iſland, ſince it flowed in 1302. This lava, though it flowed five centuries ago, is abſolutely ſterile; producing not a ſingle blade of graſs, and only affording, in ſome places, a few arid and uſeleſs plants of the lichen, or liverwort. On the ſurface, and for a little depth, it is light and ſpongy, and eaſily crumbles; but deeper, it becomes denſe and harder. This lava is of the hornſtone baſe, and has an earthy ground; varying in colour from that of iron to a reddiſh-black, and having incorporated in it very numerous feltſpars. M. Dolomieu ſays, that the eruption of the Arſo, though it continued two years, never produced any pumice, but only black ſcoriæ; but Spallanzani obſerves, that the hornſtone, by a violent fire, may be changed into a true pumice. Though this tranſmutation rarely happens, no part of the iſland, however, abounds ſo much with pumices as the Rotaro, a mountain ſituated between Caſamicciola and the city of Iſchia. This mountain is of a conical ſhape, and compoſed of tufa, pumices, and enamels. The extent of the pumices is more than a mile. The Rotaro is the only place in Iſchia which affords enamels. The mountain of St. Nicola, which in earlier times was called Epopeo, and which is in the centre of the iſland, was, as Spallanzani ſays, without doubt, the firſt that towered above the waves. The conſtituent ſubſtances of this mountain are of various kinds. The ſulphate of alumine (alum) was formerly extracted in Iſchia for commercial purpoſes; and the manufacture was principally carried on at Catrico, a place ſituated above Lacco, on the higher eminences of the Epopeo. But a careful obſerver has not been able recently to diſcover any remaining veſtige of this ſubſtance. Spallanzani concludes from experiments on different lavas, that this valuable ſubſtance might ſtill be obtained at Iſchia. This ingenious naturaliſt coaſted the iſland and examined various mountains that occupy the lower part of it. He began with the Vico, which is partly formed of tufa, and partly of two currents of lava, which deſcend into the ſea. The baſe of both theſe lavas is hornſtone, and they abound in feltſpars. He then proceeded to Monte Zaro, formed, towards the ſea, by a river of lava, extending a mile in length, and nearly two in breadth. The baſe of this lava is hornſtone, and it contains mica and feltſpars. From the termination of Monte Zaro to the commencement of Monte Imperatore, is a long and ample tract, almoſt entirely tufaceous, ſcattered over with fragments of pumice. The Monte Imperatore preſents different ſorts of lava, the baſe of which is hornſtone, intermixed with abundance of feltſpars. In many parts of the iſland our author found a ferruginous ſand, which not only moves the magnetic needle, but is ſtrongly attracted by the loadſtone. This iſland, our author apprehends, when it was firſt produced by conflagrations in ancient, and to us unknown, times, muſt have been of much greater extent than it is at preſent. Time has alſo produced a great alteration in the interior parts of the iſland. From the ſummit of Epopeo, a number of conical eminences may be ſeen; but their internal craters no longer exiſt; nor can be found in Iſchia inconteſtible traces of a ſingle one, ſince thoſe depths and ample cavities, thoſe reſemblances of theatres and amphitheatres, which may be every where obſerved, may be equally the effect of fire or water. The ſubſtances, our author conceives, which have furniſhed aliment to the different conflagrations of Iſchia, have had their centre in thoſe argillaceous rocks, which, by the above-mentioned eruption in 1302, ſhewed that they were not then exhauſted. See Spallanzani's Travels in the Two Sicilies, &c. vol. i.

Along the coaſt of this iſland a few pretty villages are diſperſed; and detached habitations are ſcattered over the ſurface of the whole iſland, and are to be found even at an elevation where the culture of the ſoil muſt ceaſe. The white colour of the houſes forms an agreeable contraſt with the verdure of the vines and gardens in which they are emboſomed. At the ſummit of the mountain, which forms this iſland, a hermitage, compoſed of a chapel, and three cells, has been excavated out of the volcanic rock. The cells are inhabited by as many hermits. One of them goes his round through the iſland twice a week, and brings back bread, oil, eggs, and every thing neceſſary for the ſervice of the altar. The inhabitants give him alms with joy, and recommend themſelves to his prayers. They make a pilgrimage annually to this chapel.

This iſland enjoys a propitious climate, and the ſky is ſeldom obſcured with clouds. The winters are mild, the reptiles harmleſs, and the ſprings cure various diſeaſes. The government is likewiſe mild, and the iſland is exempt from taxes. The king pays it a viſit every year, and gives portions to the indigent young females.

An hoſpital is eſtabliſhed here at the expence of a charitable ſociety at Naples. Some hundreds of ſick receive attendance and relief during the bathing-ſeaſon. Several barks are ſolely employed in removing the convaleſcents to Naples, and bringing back other patients to the hoſpital. The lame, who are cured of their infirmities, leave behind them their crutches, which they conſecrate to the Madona, or to ſome particular patron. The trees, ſhrubs, and plants which prefer volcanic ſoils, thrive ſurpriſingly in this iſland. Here and there are ſeen groves of oak and cheſnut trees; which are ſuffered to grow only 10 years. The orange, pomegranate, fig, Neapolitan medlar, and arbutus, are the moſt common trees in the gardens. Of wild ſhrubs, the myrtle and the maſtic are the moſt numerous. The inhabitants have ſomething peculiar in their language, their figure, and their dreſs. In their converſation, they ſcarcely ever uſe the word *man*, that of *Chriſtian* being ſubſtituted for it; and with them *Chriſtian* is ſynonymous with *Catholic*. In their pious expreſſions they ſeldom ſoar higher than the Mother of God. It is to our Lady they recommend you, when they leave you, and they wiſh you a *holy* night (*ſantiſſima notta.*) To her they apply when afflicted with diſeaſe. At the death of an adult they pray for the repoſe of his ſoul. The death of a child is regarded as an happy event. Religious feſtivals are with them days of rejoicing. N. lat. 40° 50′. E. long. 13° 46′.

The ſoil feeds no animals beſides aſſes and goats. The roofs of the houſes throughout the iſland are flat, and are uſed for drying fruits and other purpoſes.

ISCHIADICUS Morbus, in *Surgery*. See *Diſeaſe of* Hip-*joint*.

ISCHIAS. See *Diſeaſe of* Hip-*joint* and Sciatica.

ISCHIATIC, in *Anatomy*, an epithet applied to certain parts of the body ſituated near the iſchium; as the iſchiatic artery and nerve. See Artery and Nerve.

ISCHIATOCELE, in *Surgery*, a hernia taking place at the ſacro-iſchiatic foramen. See Hernia.

ISCHIM, in *Geography*, a town of Ruſſia, in the government of Tobolſk, on the river Iſchim, which runs into the Irtiſch, N. lat. 57° 45′. E. long. 90°; 108 miles S. of Tobolſk. N. lat. 56° 10′. E. long. 69° 14′.

ISCHIMSKOI, a town of Ruſſia, in the government of Tobolſk, at the conflux of the Iſchim and Oby; 112 miles E. of Tobolſk.

ISCHIO-CAVERNOSUS, in *Anatomy*, a name given by Winſlow and others to the erector penis muſcle. See Generation.

ISCHIOCELE, in *Surgery*, a hernia between the ſacrum and iſchium.

ISCHIO-COCCYGEUS, in *Anatomy*, a name for the coccygeus muſcle; which ſee.

ISCHIUM, one of the diviſions of the os innominatum. See Extremities.

Ischium *Os, Fractures of*, in *Surgery*. See Fracture.

ISCHNAMBLUCIS, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the ſelenitæ, but one of thoſe which are of a columnar form, not of the common rhomboidal one.

The word is derived from the Greek, ισχνος, *thin*, αμβλυς, *blunt* or *obtuſe*, and κιων, *a column*, and expreſſes a body in form of a thin flatted column, with obtuſe ends. The bodies of this genus are of an octohedral figure, conſiſting of ſix long planes and about two broken ends. The top and baſe planes are broader than the reſt. The crack which runs through the whole length of bodies of this genus is often filled with clay, which ſpreads itſelf into the form of an ear of ſome graſſes; of this genus there are only four known ſpecies. Hill.

ISCHNOPHONIA, in *Medicine*, from ἰσχνὸς, *thin*, and φωνὴ, *the voice*, a term which ſeems to have been uſed originally to denote a certain tenuity or ſmallneſs of the voice; but the moſt common acceptation of the word is in the ſenſe of *heſitation of ſpeech*.

ISCHURIA, from ἴσχω, *I ſtop*, and οὖρον, *urine*, ſignifies an entire ſuppreſſion or retention of the urine.

The diſcharge of urine may be altogether prevented or ſuppreſſed for a time, from four different ſets of cauſes; whence Dr. Cullen has, with great judgment, arranged the forty-three varieties of *iſchuria*, deſcribed by Sauvages after Cuſſon, under four heads or ſpecies. Theſe are, 1. Iſchuria *renalis*, in which the impediment to the excretion of urine is in the *kidnies* themſelves; 2. Iſchuria *ureterica*, in which the impediment conſiſts in an obſtruction of the canal of the *ureters*, through which the urine ſhould paſs into the bladder; 3. Iſchuria *veſicalis*, in which the urine, ſecreted by the kidnies, and tranſmitted through the ureters, is retained in the *bladder* from diſeaſe in that receptacle itſelf; and, 4. Iſchuria *urethralis*, in which the impediment is occaſioned by ſome obſtruction in the canal of the *urethra*, through which the contents of the bladder are diſcharged. See Cullen. Synopſ. Noſol. Method. Claſs iv. Ord. 5. Sauvages, Claſs x. Ord. 3.

The *renal* iſchuria, in which there is little or no ſecretion of urine effected by the kidnies, is to be diſtinguiſhed by the following circumſtances: It ſupervenes upon ſome previous affection of the kidnies, and is accompanied by pain or an uneaſy ſenſe of weight in the region of the kidnies, while, at the ſame time, there is no tumour in the hypogaſtrium, or lower portion of the belly, ſuch as a diſtended bladder would occaſion, nor any deſire to make water. The iſchuria, from obſtructed *ureters*, is accompanied by ſimilar ſymptoms, except that the pain or uneaſineſs is felt in the courſe of the ureter; it is likewiſe unaccompanied by hypogaſtric tumour, or deſire to paſs urine. The moſt frequent cauſes of theſe two forms of retention of urine are inflammation of the kidnies or of the ureters, or the preſence of calculous concretions in thoſe parts; but other cauſes have been occaſionally obſerved to produce the diſeaſe, ſuch as grumous blood, impacted in the ſame parts, and purulent matter, or mucus, obſtructing the paſſages. It may be remarked, that ſome writers have confined the term *retention* of urine to the renal form of the diſeaſe, as if they would aſſert, that, when the urine was not ſecreted, it was *retained* in the blood; and they denote the other forms of the diſeaſe by the term *ſuppreſſion* of urine :—a falſe hypotheſis, but the terms may be retained as expreſſing the facts. When the retention is connected with inflammation of the kidney or ureter, its cure will depend upon the removal of that inflammatory ſtate. (See Nephritis) And when it originates from impacted calculus, it muſt be treated with the remedies reſorted to in other calculous caſes. See Nephralgia.

The two other ſpecies of iſchuria, originating from impediments to the evacuation of the bladder, by diſeaſes of that organ itſelf, or of its outlet, the urethra, are to be diſtinguiſhed, by the evident tumour of the hypogaſtrium, above the pubes, and by the frequent urging to make water, accompanied with pain in the neck of the bladder, in the one caſe, and in ſome part of the urethra in the other. The cauſes which give riſe to the *veſical* ſuppreſſion of urine, are inflammation of the neck of the bladder ; ſtone in the bladder ; ſpaſm of the ſphincter ; palſy extending to the bladder ; over-diſtention of its fibres, from retaining the urine too long ; purulent matter, mucus, or grumous blood, lodged in the neck of the bladder ; and tumours of the neighbouring parts compreſſing the neck of the bladder, ſuch as hardened fæces in the rectum, or calculous concretions, flatus, inflammation, abſceſs, or hemorrhoidal ſwellings in the ſame bowel, and alſo the gravid uterus, or other enlargements of that viſcus. The cauſes of impediment in the canal of the urethra, which occaſion ſuppreſſion of urine, are inflammation of that paſſage ; pus, mucus, or grumous blood impacted in it ; ſtricture ; tumours in the perineum ; phimoſis, &c.

The means by which theſe cauſes of ſuppreſſion of urine are chiefly to be removed, and the diſeaſe to be cured, are principally ſurgical. See *Suppreſſion of* Urine.

Ischuria, in *Surgery*. See *Retention of* Urine.

ISEFIORD, in *Geography*, a large bay or gulf of Denmark, on the N. coaſt of the iſland of Zealand ; the mouth of which lies in N. lat. 55° 59′. E. long. 11° 50′.

ISELASTICS, Iselastica, a kind of games, or combats, celebrated in the cities of Greece and Aſia, in the time of the Roman emperors.

The victors at theſe games had very conſiderable privileges conferred on them ; after the example of Auguſtus and the Athenians, who did the like to the conquerors at the Olympic, Pythian, and Iſthmian games. They were crowned on the ſpot, immediately after their victory ; had penſions allowed them ; were furniſhed with proviſion at the public coſt ; were carried home in triumph, and made to enter their cities through a breach in the walls ; whence their appellation from εισελαυνειν, *to enter*.

ISELIN, James Christopher, in *Biography*, an eminent philologiſt and divine, was born at Baſil in 1681 ; and having laid a good foundation in grammar learning, he was admitted to his academical courſe as early as the age of 13, and at 15 he diſtinguiſhed himſelf by a Latin poem on "The Paſſage of the Rhine" by the French, which obtained for him great applauſe. In 1701 he was ordained miniſter, and on that occaſion publiſhed a diſſertation on the Babylon of the Revelations, in anſwer to the biſhop of Meaux. In 1704 he accepted the chair of eloquence and hiſtory in the univerſity of Marpurg, which he occupied with great reputation for two years. In 1706 he was appointed profeſſor of hiſtory and antiquities at Baſil, and in 1711 he was made doctor in theology, and appointed to teach that ſcience. He was invited to ſettle at Paris, which he declined, and the French academy elected him to the place of honorary member, vacant by the death of Cuper. This honour was conferred upon him in return for the pains he had taken to comply with the king's requeſt of obtaining for him copies of the acts of the council held at Baſil in the fifteenth century. He died in 1737, and his memory was honoured by a great number of eulogies in Latin and German. The works of M. Iſelin conſiſt of orations, diſſertations, and detached tracts on a variety of ſubjects, philological, theological, and miſcellaneous. Moreri.

Iselin, Isaac, was born at Baſil in 1728. He received his academical education at Gottingen, where he paid great attention to juriſprudence and ſtatiſtics under the moſt able profeſſors. He undertook the taſk of reducing the juriſprudence of the Swiſs confederation into a ſyſtem, of which he publiſhed a ſpecimen in his theſis, when he obtained the degree of doctor, under the title of "Tentamen Juris publici Helvetici." When he had completed his ſtudies he went to Paris, and obtained the acquaintance and friendſhip of the moſt eminent men of letters in that capital. After his return, he applied with great diligence to the ſtudy of juriſprudence, and in 1756 he was appointed to the important office of ſecretary to the grand council of his native city. Soon after he publiſhed his firſt work, entitled the "Dream of Mankind," which has gone through many editions. He next gave the world a work, entitled "Free Thoughts on the Depopulation of my native City," in which he recommended the admiſſion of new citizens. But his moſt important work was his "Hiſtory of Mankind," in which he traces the progreſs of the human mind from a ſtate of rudeneſs to that of refinement, and ſhews in what manner nations have emerged from obſcurity, and have been completely civilized by the introduction of arts and manufactures. Iſelin was the author alſo of a periodical work, entitled "Ephemerides of Mankind." He carried on an extenſive correſpondence both in Switzerland and foreign countries, and he wrote many excellent critiques in the "Deutſhe Bibliothek," which are ſaid to be diſtinguiſhed by their acuteneſs, modeſty, and adherence to truth. He died in the year 1782, at the age of 54. Iſelin's writings abound with exalted ideas and ingenious thoughts, and diſplay great knowledge of human nature, ardent patriotiſm, and a ſtrong vigorous mind. Gen. Biog.

ISEN, in *Geography*, a town of Bavaria ; 24 miles E.N.E. of Munich.

ISENBURG, Upper, *County of*, a principality of Germany, ſituated in the Wetterau, about 30 miles long and 10 broad. The houſe of Iſenburg is divided into ſeveral branches, taking their ſurnames reſpectively from towns on the eſtate.

Isenburg, *Lower*, a county of Germany, in the circle of the Lower Rhine, formerly governed by courts of its own, as a fief of the electorate of Treves.

Isenburg, a town of Germany, giving name to the county, ſituated on the Iſer, and ſurrounded with ſharp rocks, on one of which is a caſtle built by Charlemagne ; 10 miles N. of Coblentz. N. lat. 50° 30′. E. long 7° 35′.

Isenburg, *New*, a town of Germany, in the county of Iſenburg, founded by French refugees ; 3 miles S. of Frankfort on the Maine. N. lat. 50° 3′. E. long. 8° 38′.

ISENHAGEN, a town of Weſtphalia, in the principality of Luneburg ; 24 miles E.N.E. of Zelle.

ISEO, a town of Italy, in the department of the Benaco, on a lake to which it gives name, through which the river Oglio takes its courſe : the town was anciently called "Sabino ;" 12 miles N.W. of Breſcia.

ISER, a river of the Tyroleſe, which riſes about 5 miles N. of Inſpruck, and, paſſing by Munich, Landſhut, Landau, &c. runs into the Danube, 2 miles below Deckendorf.

ISERE, a river which riſes in the Alps, about 12 miles from mount Cenis, in a mountain called "Iſeran," in the duchy of Savoy, and, after entering France, paſſes by Grenoble, &c. and joins the Rhone, about 3 miles above Valence; navigable for boats as far as Montmelian.

Isere, formerly *Graſivaudan* and *Viennois*, one of the 11 departments of the eaſtern region of France, ſo called from the river Iſere, which croſſes it; ſituated in N. lat. 45° 30′, W. of Mont Blanc: containing 452 ſquare leagues, and 441,208 inhabitants, and divided into four diſtricts, *viz.* Vienne, including 104,689 inhabitants; Tour-du-Pin, having 99,053; Grenoble, 169,623; and St. Marcellin, 67,843 inhabitants. Its number of cantons is 44, and that of communes 558. The annual contributions amount to 3,546,809 francs, and the expences charged upon it to 338,804 francs 37 cents. This department conſiſts of barren and marſhy plains, deep vallies, and high mountains partially wooded. The chief products are grain, hemp, roots, ſome good wine, and excellent paſtures. It has mines of iron, copper, lead, coal, quarries, and mineral ſprings. Its capital is Grenoble.

ISERINE, in *Mineralogy*. See Titanium.

ISERLOHN, or Lohn, in *Geography*, a town of Germany, in the county of Mark, inhabited by Lutherans, Calviniſts, and Roman Catholics, who are allowed their ſeparate worſhip. Its manufactures are conſiderable in iron, tin, ribbons, velvets, ſilks, ſtuffs, &c.; 32 miles N.E. of Cologne. N. lat. 51° 18′. E. long. 7° 40′.

ISERNIA, a town of Naples, in the Moliſe, ſituated at the foot of the Apennines, the ſee of a biſhop; 12 miles W.S.W. of Moliſe. N. lat. 41° 38′. E. long. 41° 2′.

ISERTIA, in *Botany*, was ſo named in honour of Mr. Iſert, a German botaniſt, and ſurgeon in the Daniſh ſervice, on the coaſt of Guinea.—Schreb. 234. Willd. Sp. Pl. v. 2. 240. Mart. Mill. Dict. v. 2. Vahl. Eclog. p. 2. 27. Lamarck Illuſtr. t. 259. (Guettarda; Juſſ. 207. Aubl. Guian. v. 1. 317.) Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, coloured, four or ſix-toothed, permanent. *Cor.* of one petal, funnel-ſhaped; tube long, cylindrical, ſlightly curved; limb divided into ſix, ſubovate, rather erect, villoſe ſegments. *Stam.* Filaments ſix, very ſhort, within the throat of the corolla; anthers linear, affixed to the back, erect. *Piſt.* Germen inferior, roundiſh; ſtyle thread-ſhaped, ſurrounded by a glandule at the baſe; ſtigma ſix-cleft. *Peric.* Fruit pulpy, ſomewhat globular, crowned by the calyx, ſix-celled; the caſes of the cells brittle. *Seeds* numerous, ſmall, angulated, rough.

Eſſ. Ch. Calyx ſuperior, ſix-toothed. Corolla funnel-ſhaped, ſix-cleft. Stigma ſix-cleft. Fruit ſix-celled, many-ſeeded.

1. I. *coccinea*. Willd. n. 1. (Guettarda coccinea; Aubl. Guian. v. 3. t. 123.)—Leaves lanceolate-elliptical, clothed with hoary pubeſcence, acuminate, acute at each end. Flower-ſtalks branched, bifid. A native of woods in Guiana, flowering and bearing fruit at all ſeaſons.—This *tree* riſes to the height of ten or twelve feet, is furniſhed with erect, knotty, ſquare *branches*. *Leaves* oppoſite, large, ovate, acute, green above, downy beneath, dark-coloured, with reddiſh nerves. *Stipulas* long, broad, acute, deciduous. *Flowers* racemoſe, erect, terminal; their partial-ſtalks oppoſite, furniſhed with two little ſcales. *Calyx* purpliſh. *Tube* yellow. *Fruit* red.

2. I. *parviflora*. Willd. n. 2.—"Leaves oblong, the lower ones ſomewhat heart-ſhaped at the baſe. Bunch of flowers ovate." Found in the iſland of Trinidad.—*Leaves* generally ſmooth, ſometimes rather villoſe beneath.

ISETSK, in *Geography*, a town of Ruſſia, in the government of Tobolſk, on the Iſet, which runs into the Tobol, near Yalutorovſk; 44 miles W.S.W. of Yalutorovſk.

ISGAARD, a town of Denmark, in North Jutland, ſituated on a peninſula in the Baltic; ſeven miles E.N.E. of Aarhuus.

ISGAUR, Isguriah, or *Iſkuria*, anciently called "Dioſcurias," and "Sebaſtopolis," a town of Mingrelia, on the E. coaſt of the Black ſea, with a road for ſhips, which in ſummer is tolerably good. In 1672 it was burned down by the Abhkas, who were invited by the prince of Mingrelia to aſſiſt him againſt the Turks. N. lat. 43° 18′. E. long. 40° 32′.

ISHMAELITES, in *Ancient Geography* and *Hiſtory*, the deſcendants of Iſhmael, the ſon of Abraham by Hagar, his Egyptian bond-maid. Iſhmael was born in the year B.C. 1910, and his name, founded on a circumſtance which afforded relief to his mother, when ſhe was wandering from her maſter's houſe towards Egypt, her native country, is derived from the Hebrew יִשְׁמָעֵאל, formed of שָׁמַע, *ſhhamah*, to hear, and אֵל, *el*, God, and denoting "the Lord hath hearkened!" The heavenly meſſenger who appeared to Hagar in the wilderneſs, and inſtructed her by what name to call her future ſon, predicted alſo that he and his poſterity would prove fierce and warlike, engaged in repeated hoſtilities, and yet able to maintain their independence. Hagar, deriving encouragement from this circumſtance, returned to the houſe of Abraham, and was ſoon delivered of her promiſed ſon. The father regarded Iſhmael as the heir of his wealth, till Sarah had the promiſe of her ſon Iſaac. After the birth of Iſaac, Abraham was perſuaded by his wife to diſmiſs Hagar and her ſon; and the patriarch probably provided for their ſubſiſtence in ſome diſtant ſituation, where they could not encroach on the patrimony of Iſaac. Having wandered for ſome time in the wilderneſs of Beerſheba, they proceeded farther to the wilderneſs of Paran, which bordered on Arabia, and here Iſhmael arrived at maturity, and became an expert archer, or a hunter and warrior. In proceſs of time his mother procured for him a wife out of Egypt, by whom he had twelve ſons, who eventually eſtabliſhed themſelves as the heads of ſo many diſtinct Arabian tribes. Accordingly the deſcendants of Iſhmael are mentioned in hiſtory, under the general name of Arabians and Iſhmaelites. Of Iſhmael's perſonal hiſtory, we merely learn from the ſacred writings, that he joined with his brother Iſaac in paying the laſt tribute of reſpect to the remains of their father; and that he died at the age of 137 years (B.C. 1773.) Gen. xxv. 9 18. His deſcendants, according to the ſcripture account, ſpread themſelves "from Havilah to Shur, that is before Egypt, as thou goeſt into Aſſyria." From this brief ſtatement, we may conjecture how far their territory extended; for Havilah, according to the generality of writers, was ſituated near the confluence of the Tigris and Euphrates, and Shur, on the iſthmus which ſeparates Arabia from Egypt, now called the iſthmus of Suez. From thence we may well imagine, that they ſpread themſelves on both ſides ſo far as to have taken poſſeſſion of the greateſt part of Arabia; and, indeed, Joſephus (Antiq. l. i c. 13.) does not ſcruple to ſtyle their progenitor the founder of the Arabian nation. See Arabia.

ISI, in *Hindoo Mythology*, is a name of the goddeſs Parvati, conſort of Siva, in his form of *Iſa*; which ſee.

ISIA, Ισεια, feaſts and ſacrifices anciently ſolemnized in honour of the goddeſs Iſis.

The Iſia were full of the moſt abominable impurities; and for that reaſon, thoſe who were initiated into them were obliged to take an oath of ſecrecy. They held for nine days ſucceſſively, but grew ſo ſcandalous, that the ſenate aboliſhed them at Rome, under the conſulate of Piſo and Gabinius. They were re-eſtabliſhed by Auguſtus, and the emperor Commodus himſelf aſſiſted at them, appearing among the prieſts of that goddeſs with his head ſhaven, and carrying the Anubis.

ISIAC Table is one of the moſt conſiderable monuments of antiquity, being a plate of copper or braſs, diſcovered at Rome, in 1525, and ſuppoſed by the various figures in bas relief upon it, to repreſent the feaſts of Iſis, and other Egyptian deities.

With regard to the hiſtory of this monument, we may obſerve, that the copper or braſs ground was overlaid with a black enamel, artificially intermixed with ſmall plates of ſilver. When, in the year 1525, the conſtable of Bourbon took the city of Rome, a lockſmith bought it from a ſoldier, and then ſold it to cardinal Bembo, after whoſe death it came into the hands of the duke of Mantua, and was kept in that family till it was loſt at the taking of that city by the Imperialiſts in the year 1630, nor has it been ever heard of ſince. By good fortune it had been engraved in its full proportion, and with all poſſible exactneſs, by Æneas Vico of Parma. This tablet was divided into three horizontal compartments, in each of which were different ſcenes, containing different actions. Thoſe compartments are, as it were, different cartouches, diſtinguiſhed ſometimes by ſingle ſtrokes only, but oftener by a very large faſcia, which is full of hieroglyphics, that is, of that myſterious writing, conſecrated by the ancient Egyptians to the myſteries of religion. The four ſides of the table were incloſed with a border, filled up, like the ground, with ſeveral figures of the Egyptian gods, and with a great number of hieroglyphics. There have been various opinions as to the antiquity of this monument: ſome have ſuppoſed that it was engraved long before the time when the Egyptians worſhipped the figures of men and women. Others, among whom is biſhop Warburton, apprehend, that it was made at Rome, by perſons attached to the worſhip of Iſis. Dr. Warburton conſiders it as one of the moſt modern of the Egyptian monuments, on account of the great mixture of hieroglyphic characters which it bears.

It has been alſo a queſtion, whatever may be thought of the antiquity of this tablet, whether it only repreſents the myſteries of Iſis, whoſe figure, placed in a ſort of niche, occupies the centre; or whether it contains the principal points of the Egyptian theology, ſince all their gods are here repreſented. Pignorius, Kircher, and Chifflet, have offered their various conjectures concerning the deſign and meaning of this monument. The abbé Banier (in his "Mythology, &c." vol. i. p. 567.) declares it to be his opinion, that it was a votive table, which ſome prince, or private perſon, had conſecrated to Iſis, as an acknowledgment for ſome benefit which he believed ſhe had conferred upon him. That goddeſs occupies the principal place in it, and the deſign of varying her attitudes and ſymbols, muſt have been to point out to us, in how many different modes ſhe was repreſented, as well as the different ſacrifices that were offered to her. Accordingly, three ſorts of theſe are there to be obſerved, one of animals, another of plants, and a third of libations. Perhaps the perſon who had conſecrated this table to Iſis, had offered to her all theſe ſorts of ſacrifices, either for having been cured of ſome ſevere diſeaſe, or for having been delivered from ſome great danger, to which he had been expoſed by ſea; for that goddeſs was equally invoked in diſeaſes, and when people were entering upon a long voyage; ſince the epithets of "Salutaris" and "Pelagia" were added to her name. Nothing was more common than the votive tables, conſecrated to Iſis. All the temples of this goddeſs were full of them; and works of that ſort procured a living to great numbers of painters, as we learn from Juvenal (Sat. 18.):

> "Et quam votivâ teſtantur fano tabellâ
> Plurima, Pictores quis neſcit ab Iſide paſci."

ISIACI, prieſts of the goddeſs Iſis. Dioſcorides tells us, that they bore a branch of ſea-wormwood in their hands inſtead of olive. They ſung the praiſes of the goddeſs twice a day, *viz.* at the riſing of the ſun, when they opened her temple; after which they begged alms the reſt of the day, and returning at night, repeated their oriſons, and ſhut up the temple.

Such was the life and office of the Iſiaci; they never covered their feet with any thing but the thin bark of the plant papyrus, which occaſioned Prudentius and others to ſay they went bare-footed. They wore no garments but linen, becauſe Iſis was the firſt who taught mankind the culture of this commodity. See Diodorus Siculus, and Plutarch's Iſis and Oſiris.

ISIDORE *of Peluſium*, in *Biography*, a celebrated diſciple of St. John Chryſoſtom, and diſtinguiſhed in the Greek and Roman calendars by the epithet of "Saint," was by birth an Egyptian; and flouriſhed, as the contemporary of Nonnus, and, according to Cave, about the year 412. As his name does not occur after the year 433, he probably died before the middle of the fifth century. He embraced the monaſtic life at Peluſium, and acquired, by his auſterities and indefatigable application to literary ſtudies, high reputation for ſanctity, learning, and eloquence, ſo that he was honoured by the Greeks with the appellation of "the famous." Facundus ſays, that he wrote 2000 epiſtles for the edification of the church; and Suidas aſcribes to him 3000, explanatory of the ſcriptures. Of theſe there are ſtill extant 2612, in five books; of which Moſheim ſpeaks in terms of high commendation: ſaying of them, that though they are ſhort, they are admirably written, both with reſpect to the ſolidity of the matter, and the purity and elegance of their ſtyle. He adds, that they manifeſt more piety, genius, erudition, and wiſdom, than are to be found in the voluminous productions of many other writers, and that they caſt a conſiderable degree of light upon ſeveral parts of ſcripture. Dr. Lardner, citing a diſſertation of Dr. Heumann on Iſidore of Peluſium (apud Primitias Gottingenſes, Hanover, 1738, 4to.), informs us, that this learned writer argues, that moſt of Iſidore's letters are fictitious, and not a real correſpondence; and, ſays Lardner, he ſeems to have proved what he advances. Iſidore has largely quoted all, or moſt of the canonical books of the Old Teſtament; but he very ſeldom quotes any apocryphal books. He alſo often cites the four goſpels, the acts of the apoſtles, and all St. Paul's epiſtles, except that to Philemon. He likewiſe quotes and explains paſſages of the epiſtle of James, the firſt and ſecond epiſtle of Peter, and the firſt epiſtle of John. He explains the 8th verſe of the ſecond epiſtle of John, and there is no reaſon to doubt his having received the other. He explains a paſſage of the epiſtle of Jude; and uſes ſeveral expreſſions that ſeem to have been taken from the book of Revelation: ſo that, upon the whole, his canon of ſcripture was the ſame as our's. Iſidore had a great reſpect for the ſcriptures, and often recommends the peruſal of them. The beſt edition of his works was publiſhed at Paris, in Greek and Latin, 1638, folio. Cave. Dupin. Moſheim. Lardner.

Isidore *of Seville*, was an eminent biſhop of this city in

Spain for 40 years, from the year 595 or 596 to 636. He was the ſon of Severianus, governor of Carthagena, and brother of Leander, biſhop of Seville, who had the care of his education. He preſided at a council held in Seville in 619, and at another in Toledo in 633; in which meaſures were adopted that ſerved to reform the lax ſtate of eccleſiaſtical diſcipline and manners in Spain. He was a voluminous writer, and his works are enumerated by Dupin and Lardner; and the beſt edition of them was publiſhed at Paris, in 1601, by father James du Breuil, a Benedictine monk, in folio. As a writer, he is characterized more by learning and pedantry, than by judgment, taſte, or accuracy. Moſheim reckons him among thoſe authors, who gave riſe, by their collections, to that ſpecies of divinity, which was afterwards diſtinguiſhed by the Latins under the denomination of "poſitive theology." Dupin, though he repreſents him as a prodigy of learning, and an oracle, admits that he wanted genius, and a diſcriminating judgment; and that his opinions are often falſe, and his remarks trivial, and frequently erroneous; and that his ſtyle is rather perſpicuous than eloquent or poliſhed. Iſidore received all the ſame books of the New Teſtament which we receive; and he ſpeaks of them with great reſpect, ſtating that they contain the precepts of life and the rule of faith, and that they may be profitably read by all ſorts of men. This Iſidore is ſometimes called "the younger," to diſtinguiſh him from Iſidore, biſhop of Cordova, in the fifth century, who wrote "Commentaries on the two Books of Kings," which he dedicated to Paul Oroſius, the diſciple of St. Auguſtine. Cave. Moſheim. Dupin. Lardner.

Iſidore was a man of great and extenſive learning, but particularly, it is ſaid, in geometry, muſic, and aſtrology, which, in the time of Iſidore, was another name for aſtronomy.

His book on the holy offices contains the principal points of diſcipline and eccleſiaſtical polity. He is frequently ranked among muſical writers. In his treatiſe on the divine offices, much curious information occurs concerning canto fermo, and muſic in general; but particularly its introduction into the church, the inſtitution of the four tones by St. Ambroſe, and the extenſion of that number to eight by St. Gregory. In treating of ſecular muſic, he has a ſhort chapter on each of the following ſubjects: of muſic, and its name: of its invention: its definition: of its three conſtituent parts, harmonics, rhythm, and metre: of muſical numbers: of the three-fold diviſions of muſic; 1ſt, Of the harmonical diviſion of muſic; 2dly, Of the organic or inſtrumental diviſion; 3dly, Of the rhythmical diviſion.

Theſe chapters are very ſhort, and contain little more than compreſſed definitions of muſical terms. In enumerating the ſeven liberal arts, cap. ii. he ranks them in the following manner: grammar, rhetoric, logic, arithmetic, muſic, geometry, aſtronomy. Iſidore died in the year 636, and is enrolled among the ſaints of the Romiſh calendar.

Isidore, Mercator, or Peccator, the name given to the author of a collection of canons, which for ſome time were attributed to Iſidore of Seville, is ſuppoſed to have flouriſhed towards the cloſe of the eighth century. This collection contains the pretended decretals of more than ſixty popes, which are followed by the canons of the councils which were held in Greece, Africa, France, and Spain. They are generally conſidered as ſpurious, of which there is abundant internal evidence, ariſing from the ſtyle, the incorrectneſs of their dates, and from many hiſtorical, geographical, and chronological errors. They were invented for the purpoſe of ſtrengthening the already overgrown power of the church, and to enforce the belief that the biſhop of Rome was conſtituted and appointed by Jeſus Chriſt as ſupreme legiſlator and judge of the church univerſal; and that, therefore, the biſhops derived all their authority from the Roman pontiff, nor could the councils determine any thing without his permiſſion and conſent. Though the forgery was manifeſt to every thinking perſon, yet with the great maſs of the people it produced the intended effect, and contributed to enrich and aggrandize the Roman pontiffs, and exalt them above all human authority and juriſdiction. Moreri. Moſheim.

Isidore *of Charax*, a Greek author, in the time of Ptolemy Lagus, about three centuries before the Chriſtian era, compoſed ſeveral hiſtorical works, and a deſcription of Parthia, which has been publiſhed by Heſchelius, and likewiſe at Oxford, among the collection of the leſſer geographers. It is entitled "Manſiones Parthicæ."

ISIDORO, St., in *Geography*, a town of California; 30 miles N.N.W. of Loreto.

ISIGNY, a town of France, in the department of Calvados, and chief place of a canton, in the diſtrict of Bayeux; 29 miles W.N.W. of Caen. The place contains 1829, and the canton 13,651 inhabitants, on a territory of 240 kiliometres, in 29 communes. N. lat. 49 19. W. long. 1 .—Alſo, a town of France, in the department of the Channel, and chief place of a canton, in the diſtrict of Mortain; 9 miles W. of Mortain. The place contains 358, and the canton 5708 inhabitants, on a territory of 75 kiliometres, in 11 communes.

ISIKOVA, a town of Japan, in the iſland of Niphon; 20 miles S.S.W. of Kanazava.

ISIMA, a town of France, in the department of the Dora; 19 miles E. of Aoſta.

ISIME, a town of Thibet; 25 miles E. of Harachar.

ISINDI, in *Ancient Geography*, an epiſcopal town of Aſia, in the ſecond Pamphylia.

ISINDUS, or Isinda, a town of Aſia, in Ionia.

ISINGLASS, a name given to Muſcovy talc, and to *Ichthyocolla*; which ſee. See alſo Glue.

Isinglass *Fiſh*, in *Ichthyology*. See Acipenser and Huso.

ISIS, in *Ancient Geography*, *Tchorok*, a river of Aſia, in the Colchide, which, according to Arrian, was navigable; and he places it between the mouth of the Acinaſis and that of Mogra, about 90 ſtadia from the one and the other.

Isis, in *Geography*, a name frequently given to the river Thames, before it joins the Thame at Dorcheſter; but this river is only a branch of the Thames, which riſes near Minchinhampton in Glouceſterſhire, and joins the main ſtream near Lechlade.

Isis, in *Mythology*, a goddeſs of the ancient Egyptians, worſhipped by them and many other nations.

Iſis, according to ſome, is ſynonymous with παλαια, ancient or aged, an expreſſion which, in the Egyptian theology, was appropriated to the moon, on account of her eternal birth. According to others, and particularly Jablonſki, (Pantheon Egyptiacum, vol. ii.) Iſis, in the Egyptian language, ſignified "the cauſe of abundance;" and it was applied by the Egyptian prieſts to the moon, becauſe they ſuppoſed, in conſequence of attention to the phenomena of nature, that the moon has a direct influence on the atmoſphere, the winds, and the rains; and therefore they regarded it, like the ſun (which they called Oſiris), as one of the ſources of the inundation of the Nile. Hence they were led to characterize this beneficial effect, by denominating the cauſe of it Iſis. This is ſaid to have happened 320 years after the exodus of the Iſraelites; at which period they beſtowed ſurnames on the ſun and moon, proper to fix their diſcoveries, and preſented the people with a new theology.

logy. According to Herodotus and all the ancients, Oſiris and Iſis were the two great divinities of the Egyptians, and the moſt generally worſhipped in the whole country; and, indeed, almoſt the whole mythology of thoſe ancient people is comprehended under what their prieſts fabled about them. The Greek and Latin authors extend ſtill farther this Egyptian mythology concerning Iſis and Oſiris, ſince, according to them, they comprehended all nature, and all the gods of that ancient people. According to Herodotus, the Egyptians took Iſis for Ceres, and believed that Apollo and Diana were her children, and that Latona had only been their nurſe; differing from the Greeks, who regarded her as their mother. According to the ſame author, Apollo and Orus, Diana and Bubaſtis, Ceres and Iſis, are the ſame; and hence it is, he ſays, that Æſchylus makes Diana the daughter of Ceres. Moreover, the mythologiſts aſſert, that Iſis and Oſiris included, under different names, all the gods of paganiſm; ſince, according to them, Iſis is Terra, Ceres, Juno, the Moon, Minerva, Cybele, Venus, Diana, and, in one word, all nature: and hence, as they pretend, this goddeſs was called Myrionyma, that is, who has a thouſand names. Oſiris alſo, in their opinion, is Bacchus or Dionyſius, the Sun, Serapis, Pluto, Ammon, Pan, Apis, Adonis, &c. It is difficult to aſcertain the real origin of Iſis amidſt theſe mythological fables. Some have pretended that the fable of Iſis came originally from Greece; and they have confounded that goddeſs with Io, the daughter of Inachus, king of Argos. The fable of Io is recited by Ovid in his "Metamorphoſis," (l. 38.) and this fable has been differently underſtood and explained by various authors. It is allowed that there was in Greece a princeſs named Io, the daughter of Inachus, or, as Pauſanias ſays, of Jaſus; and the Greeks took occaſion to confound Iſis and Io, in conſequence of the introduction of the worſhip of Iſis into Greece, eſpecially into the city of Argos. Inachus taught the Greeks to pay honour to Iſis, and hence they looked upon her as his daughter. Jablonſki ſays, that the Egyptians, from remote antiquity, worſhipped the moon, under her proper name of "Ioh," which, in the Egyptian language, ſignifies the moon; and that Inachus, the firſt king of Argos, carried this worſhip into Greece, nearly 300 years before the birth of Moſes. It is there, ſays Euſtathius, that a cow is the ſymbol of Io, or the moon; for in the Argian language, the moon is called Io. The Grecian fable, on the other hand, makes Io croſs the ſea from Greece, metamorphoſed into a cow, and conducts her into Egypt, where ſhe receives the name of Iſis. Accordingly, Lucian, well verſed in ancient mythology, puts theſe words into the mouth of Jupiter, "Conduct Io to the banks of the Nile, acroſs the waves of the ſea. Let her become Iſis: let her be the goddeſs of the Egyptians; let her augment the waters of the river, and let looſe the winds." As the Nile began to increaſe at the new moon which follows the ſolſtice, the Egyptian prieſts, who regarded this planet as the mother of the winds, decreed to her the honour of this phenomenon. "Iſis," ſays Servius, (Obſ. on the Æneid. l. 8.) "is the genius of the Nile. The ſiſtrum ſhe bears in her hand indicates the increaſe and the flowing of the waters; the vaſe ſhe holds in her left marks their abundance in all the canals." Temples were erected to her in the different provinces, and ſhe had altars and ſacrifices throughout the whole country. "Coptos," ſays Euſtathius, "is a city of the Thebais, where Io is adored under the name of Iſis. It is on her feſtivals that they celebrate with the ſiſtrum the increaſe of the Nile." The people, from the allegorical language of the prieſts, imagined that they owed this bounty to the tears of that divinity. The Egyptians, according to Pauſanias, were perſuaded that the tears of Iſis had the virtue to augment the Nile, and to make it riſe up into the country. Savary, in his "Letters on Egypt," ſays, that the Copts are not yet cured of this ſuperſtition.

Notwithſtanding the fabulous pretenſions of the Greeks with regard to the origin of Iſis, and their attempts to identify her with their Io, the Egyptians, according to Diodorus Siculus (l. i.) and Plutarch (De Iſ. et Oſir.) aſſert that this princeſs was born in their country; that ſhe married Oſiris, that they lived together in perfect harmony, and that they concurred in their endeavours to poliſh and civilize their ſubjects, to teach them agriculture, and ſeveral other neceſſary arts of life. Diodorus adds, that Oſiris, determining on an expedition to India for purpoſes of civilization, ſettled Iſis regent of his kingdom. (See Bacchus.) On his return to Egypt he found that his brother Typhon had formed a party againſt the government. Typhon, however, reſiſted the gentle means uſed by Oſiris for ſubduing his ambitious ſpirit, and, under a pretence of hoſpitality, confined him in a cheſt exquiſitely wrought, and threw it into the Nile. When Iſis heard of her huſband's tragical end, ſhe made diligent ſearch for the corpſe, and having found it in Phœnicia, was allured by the king of Byblos to carry it off to Egypt. Having lamented over it, ſhe at length cauſed it be interred at Abydos, a town ſituated to the weſt of the Nile. In the mean time Typhon was contriving to ſecure his new empire, but Iſis, being recovered from her diſtreſs, collected her troops, and placed them under the conduct of Orus, her ſon, who purſued the tyrant, and vanquiſhed him in two pitched battles. (See Typhon.) Iſis having died ſome time after her ſon's victory over Typhon, the Egyptians paid adoration to her with her huſband Oſiris, as to divinities; and becauſe they had applied themſelves, during their reign, to teach agriculture, the ox and the cow became their ſymbols. Feſtivals were inſtituted to their honour, in which ſeveral infamous rites were afterwards introduced. There the infamous image of the Phallus which Iſis had conſecrated, was carried in proceſſion, and it became the ſymbol of fruitfulneſs, though in its original inſtitution it had only been the mark of Iſis's paſſion for Oſiris her huſband. Diodorus Siculus has recorded the following inſcription on an ancient monument, by which Iſis was characterized. "I, Iſis, am the queen of this country. And I had Mercury for my prime miniſter. None had power to hinder the execution of my orders. I am the eldeſt daughter of Saturn, the youngeſt of the gods. I am the ſiſter and the wife of king Oſiris. I am the mother of king Orus. I am ſhe who reſides in the dog-ſtar. The city of Bubaſtis was built in honour to me. Rejoice, O Egypt, thou that haſt been to me inſtead of a nurſe, and mother." The following inſcription, according to Plutarch (De Iſ. et Oſir.) was engraved upon the pavement of Minerva's temple. "I am all that has been, that is, and that ſhall be, and none among mortals has hitherto taken off my veil."

The Egyptains, having called the moon Iſis, or the cauſe of abundance, applied this epithet to the earth, as the mother of fruits. We know, ſays Macrobius (Saturn. l. i.), that Oſiris is the ſun, and Iſis the earth. Iſis, in the Egyptian language, adds Servius, means the earth. In this point of view, ſhe has a ſtriking affinity to the Ceres of the Greeks; and this agrees with the account given of her by Herodotus (l. ii.). Plutarch informs us, that the prieſts honoured only with the name of Iſis that part of Egypt which was watered by the Nile, and in alluſion only to her fecundity: he adds, that, in the ſacred language, they termed the inundation, the marriage of Oſiris with Iſis.

Iſis is reported by Diodorus Siculus to have invented many excellent medicines; and hence, ſays he, after ſhe was received among the number of the deities, ſhe was applied to for the cure of diſtempers; and frequently indicated remedies by dreams. Galen takes notice of ſome plaſters which bear her name. Banier's Mythology, vol. i. Savary's Letters on Egypt, vol. ii. See Bubastis, Orus, Osiris, and Sothis.

Isis, in *Zoology*, a genus of Zoophytes of a ramoſe or plant-like form, the ſtem and branches of which are compoſed of ſtony articulations, longitudinally ſtriated, united by ſpongy or horny junctures, and covered, when living or in a recent ſtate, by a ſoft porous cellular fleſh or bark; and the mouths beſet with oviparous polypes. The ſpecies of this family are entirely of the marine kind, and moſtly inhabitants of the Indian ſeas.

Species.

Hippuris. Joints white with black junctures. *Iſis hippuris*, Linn. *Sertularia ramoſiſſima*, &c. Hort. Cliffort. *Iſis*, Pallas, Ellis, &c. *Hippuris ſaxea*, Cluſius. *Accabarium album*, Rumpf. *Lithophyton*, &c. Gualt.

A native of the Indian ſeas, where it is found growing to rocks, and is from ſix inches to two or three feet in height. The fleſh, when recent, is bright orange or red, the bone or ſtony part, as in the dried ſtate, whitiſh. A variety is deſcribed by Eſper under the name of Iſis elongata.

Dichotoma. Stem coralline, with ſmooth joints and decorticated junctures. Gmel. *Iſis articulata filiformis*, &c. Pallas. *Hippuris coralloides carnea capenſis*, Petiver.

This ſpecies is ſomewhat flexible, about ſix inches in height, with fleſh-coloured joints, and fleſh of a cinnabar colour, beſet with convex papillæ. It inhabits the ſeas of India and Ethiopia.

Ochracea. Stem coralline, with decorticated joints and knotty junctures. Gmel. *Lithoxylon*, &c. Hort. Cliffort. *Iſis articulata paniculato-dichotoma ramoſiſſima explanata, cortice hinc papilloſo*, Pallas. *Iſis*, &c. Soland. *Corallium rubrum indicum*, Ellis Phil. Tranſ. *Accabarium rubrum*, Rumpf. *Pſeudocorallium croceum*, Ray. *Hippuris ſaxea fulvo-rubra conſteniana*, Moriſ. *Accabaar ſeu corallodendron vulgare rubrum*, Seba.

Inhabits the ſeas of the Eaſt Indies; the colour deep-red, or ſometimes white, with the junctures browniſh-yellow; the ſtem irregularly grooved, the branches numerous, dichotomous and ſpread, the joints connected by yellow ſpongy knobs; fleſh yellow, with numerous ſtellated mouths, the habitations of polypes, each of which is furniſhed with eight claws.

Entrochia. Stem teſtaceous, round, with orbicular perforated joints and verticillated dichotomous branches. Gmel.

Stem about three quarters of an inch in thickneſs, with crowded flat orbicular joints, perforated in the centre, the perforations pentangular, with the diſk ſomewhat ſtriated from the centre, the outer bark unequal and ſurrounded with a row of tubercles: branches thin, dichotomous, continued and not jointed. Inhabits the ocean.

Asteria. Stem teſtaceous, jointed, pentagonal; the branches verticillated with a terminal dichotomous ſtar. Gmel. *Encrinus capite ſtellato ramoſo dichotomo pentagono equiſetiformi*, Ellis Phil. Tranſ. *Palma marina e Martinica*, Guettard Act. Pariſ.

Found in the ſeas about the iſland of Barbadoes. Neither this nor the ſpecies preceding, though retained under the genus Iſis, upon the authority of Gmelin, can with propriety be conſidered as appertaining to that genus, or perhaps to any other, at preſent eſtabliſhed among naturaliſts. They unqueſtionably belong to a race of creatures whoſe manners, and even ſtructure, are not at this time very clearly underſtood.

Coccinea. Stem jointed, ſlender, very red, and ſomewhat ſtriated; joints united by ſhort yellowiſh ſpongy junctures; fleſh on the outſide covered with ſmall ſcarlet prominent cells, each furniſhed with a mouth. Solander.

A diminutive kind of coral, with irregularly ſpreading branches, and which rarely exceeds the height of two or three inches. It is a native of the Indian ocean, and is ſometimes found entirely white.

ISIT, in *Geography*, a town of Ruſſia, in the government of Irkutſk, on the Lena. N. lat. 61°. E. long. 123° 50'.

ISKA, a name given by the ancients to a light kind of agaric, growing to the old ſtumps of the oak, hazel, and other trees. This being a very light kind of fuel, was uſed by the ancients in the manner of a cautery, as we have learned from the Indians to uſe moxa, or the down of mugwort leaves.

ISKARSKOIGOROD, in *Geography*, a town of Ruſſia, in the government of Toboiſk. N. lat. 60° 5'. E. long. 59° 14'.

ISKASKAMAGTI, a lake of Canada; 84 miles N.W. of Quebec. N. lat. 47° 50'. W. long. 72° 25'.

ISKIM, a river of Perſia, which runs into the Arabian ſea, N. lat. 25° 45'. E. long. 57° 9'.

ISKOLDZ, a town of Lithuania, in the palatinate of Novogrodek; 30 miles S. E. of Novogrodek.

ISKOROSE, a town of Poland, in Volhynia; 48 miles N. of Zytomiers.

ISLA, Joseph Francis de, in *Biography*, a Spaniſh Jeſuit of Madrid, who, after the deſtruction of his order, retired to Italy, and died at Bologna in 1781. He was author of a ſatire on the ignorance and vices of the monks, entitled "Hiſtoria del Fra. Gerundio de Compazas alias Zotes," which the ſupreme council of Caſtile was obliged to ſuppreſs. It has been tranſlated into Engliſh and German, and it is ſaid that ſince the time of Cervantes, no Spaniſh writer has diſplayed ſo much wit and humour. Gen. Biog.

Isla, in *Geography*, a river of Scotland, which riſes in the ſhire of Angus, and runs into the Tay, 10 miles N. of Perth.

Isla. See Ila.

ISLAM. See Mahometans.

ISLAMABAD, a town of Bengal, and capital of the province of Chittigong, ſituated on the river Chittigong, or Currumpelly, about 12 miles from the bay of Bengal. N. lat. 22° 20'. E. long. 91° 45'.—Alſo, a ſmall province of Bengal, between Goragot and Patladah.

ISLAMNAGUR, a town of Hindooſtan, in the circar of Bopal; 10 miles N.N.E. of Bopaltol.

ISLAMPOUR, a town of Hindooſtan, in the circar of Nagore; 36 miles N.E. of Didwana.—Alſo, a town of Hindooſtan, in Bahar; 28 miles S. of Patna. N. lat. 25° 8'. E. long. 85° 43'.—Alſo, a town of Hindooſtan, in Viſiapour; 15 miles S.W. of Currer.—Alſo, a town of Hindooſtan, in the circar of Jyenagur; 70 miles N.N.W. of Jyepour.

ISLAMTI, a town of Aſiatic Turkey, in Caramania; 30 miles S.S.E. of Kaiſarieh.

ISLAND, or Isle, a tract of dry land encompaſſed with water; either with the ſea, a river, or lake. In which ſenſe iſland ſtands contradiſtinguiſhed from continent, or terra firma.

Some conclude that iſlands are as ancient as the world, and it is by no means probable, that the large iſlands far remote from the continent are new, or that they either aroſe out of the ſea, or were torn from the main land. Nor is it leſs certain, that there have been new iſlands formed by the caſting up of vaſt heaps of clay, mud, ſand, &c. as that, for inſtance, of Tſongming, in the province of Nanquin, in China: or by the violence of the ſea, which has torn off large promontories from the continent, as the ancients imagined Sicily, and even Great Britain, to have been formed. It is alſo certain, that ſome have emerged above the waves, as Santorini formerly, and three other iſles near it in later times; the laſt in 1707, which roſe from the bottom of the ſea, after an earthquake, that was ſuppoſed to have looſened it from its hold.

Several naturaliſts are of opinion, that iſlands were formed at the deluge: others think they have been rent and ſeparated from the continent by violent ſtorms, inundations, and earthquakes. Theſe laſt have obſerved that the Eaſt Indies, which abound in iſlands more than any other part of the world, are likewiſe more annoyed with earthquakes, tempeſts, lightnings, volcanos, &c. than any other part.

Varenius thinks moſt of theſe opinions true in ſome inſtances, and believes that there have been iſlands produced each of theſe ways. St. Helena, Aſcenſion, and other ſteep rocky iſlands, he ſuppoſes to have become ſo, by the ſeas overflowing the neighbouring champaigns. By the heaping up huge quantities of ſand, and other terreſtrial matters, he thinks the iſlands of Zealand, Japan, &c. were formed: Sumatra and Ceylon, and moſt of the Eaſt Indian iſlands, he rather thinks, were rent off from the main land; and concludes, that the iſlands of the Archipelago were formed in the ſame way; imagining it probable, that Deucalion's flood might contribute towards it. Many iſlands in the South ſea are formed by banks of coral, the production of inſects. For an account of theſe by Alexander Dalrymple, eſq. ſee the Philoſophical Tranſactions, vol. lvii. p. 394.

The ancients had a notion, that Delos and ſome few other iſlands roſe from the bottom of the ſea; which, how fabulous ſoever it might appear, agrees very well with ſome later obſervations. Seneca takes notice, that the iſland of Theraſia roſe out of the Ægean ſea in his time, of which the mariners were eye-witneſſes. Concerning the legal occupancy and property of new iſlands, ſee ALLUVION.

Iſlands may be conſidered under ſix different heads, with a view to their ſtructure or ſubterranean geography: 1. Such as conſiſt of an unſtratified maſs, as of granite, baſalt, &c. of which ſome ſmall rocky iſlands appear to conſiſt. 2. Of mantle-ſhaped ſtrata, as M. Werner has named thoſe that ſurround a central hump or maſs, from which they dip in all directions: the projection of ſuch iſlands above the water being occaſioned by an original hump in the ſtrata. 3. They are occaſioned by hummocks, or piles of ſtrata, left when the ſurrounding ſtrata were denudated, or excavated for the bed of the ſea: England ſeems ſeparated from France by this cauſe. 4. By lifted tracts of ſtrata: it will only be practicable to diſtinguiſh this caſe from the laſt in iſlands near to others, or to a continent, in which the ſame ſtrata are found on the oppoſite coaſts, by which to obſerve, whether the iſland tract has riſen, or the intermediate part ſunk which forms the channel of ſeparation. 5. To volcanic eruptions in the bottom of the ſea: ſuch are generally of modern formation compared with the antiquity of the four preceding claſſes, and have, ſeveral of them, appeared within the periods of hiſtory; and, 6. To gravel ſand and ſilt thrown up by the waves and tide, and accumulated in height by the blowing of the ſands from the beach, until ſmall iſlands are thus raiſed permanently above the level of the ſea; ſome of them without aſſiſtance from man, but the greater part of the newly formed iſlands on the coaſts of the ocean have been gained, and are preſerved by artificial banks, from the overflowings of the high tides. In large iſlands, like England, great varieties of theſe caſes will doubtleſs be found to obtain in their ſtructure: the eaſtern ſides of the greater part of the iſlands are, perhaps, the flatteſt, and the weſtern ſides the moſt abrupt, owing to the ſtrata dipping towards the eaſt, but it is by no means true, that the weſtern ſides of iſlands and continents are always the moſt abrupt, ſince often, the ſtrata dip to the weſt, as they do and paſs under the ſea, in the coal works at Whitehaven and Workington in Cumberland.

ISLANDS, *Floating*. Hiſtories are full of accounts of floating-iſlands; but moſt of them are either falſe or founded on exaggerations. What we generally ſee of this kind is no more than the concretion of the lighter and more viſcous matter floating on the ſurface of water in cakes, and with the roots of plants, forming congeries of different ſizes, which not being fixed to the ſhore in any part, are blown about by the winds, and float on the ſurface. Theſe are generally found in lakes, where they are confined from being carried too far; and from being broken by the agitation of the water. And in proceſs of time ſome of them acquire a very conſiderable ſize. Seneca tells us of many of theſe floating iſlands in Italy; and ſome later writers have deſcribed not a few of them in other places. But however true the hiſtories of theſe might have been at the time when they were written, there remain very few proofs of their truth at this time, theſe iſlands having either diſappeared again, or having been fixed to the ſides, in ſome part, in ſuch a manner as to have made a part of the ſhore. Pliny tells us of a great iſland, which at one time ſwam about in the lake Cutilia, in the country of Reatinum, which was diſcovered to the old Romans by an oracle: and Pomponius tells us, that in Lydia there were ſeveral iſlands ſo looſe in their foundations, that every little accident ſhook and removed them. Herodotus ſpeaks alſo very largely of the lake Chemnis in Ægypt. See ABSORPTIONS *of the Earth*.

ISLANDS, *Fortunate*. See FORTUNATE.

ISLANDS, *Volcanic*. See VOLCANO.

Gryphiander has written a Latin treatiſe expreſsly on iſlands, "De Inſula."

ISLAND *Bay*, a bay on the E. coaſt of the iſland of Paraguay. N. lat. 6° 15.′ E. long. 118° 83′.

ISLANDS, *Bay of*. See BAY.

ISLANDS, *Bayona*. See BAYONA *Iſlands*.

ISLAND *Magee*, a peninſula on the eaſt coaſt of the county of Antrim, Ireland, forming one ſide of the lough, or harbour of Larne.

ISLAND, or *Iceland Cryſtal*. See CRYSTAL.

ISLAND-*Fiſh*, in the *Fiſh-trade*, a name given to the common cod-fiſh, when it has been caught and preſerved in Iceland.

ISLAS ESTOLAS, in *Geography*, a cluſter of ſmall iſlands in the Atlantic, near the coaſt of Spain. N. lat. 42° 12′. W. long. 8° 55′.

ISLAS *Medas*, three ſmall iſlands in the Mediterranean, near the coaſt of Spain. N. lat. 42° 3′. E. long. 3° 4′.

ISLAS *Oſas*, rocky iſlets in the Atlantic, near the coaſt of Spain. N. lat. 42° 17′. W. long. 8° 56′.

ISLAS *de Siſarga*, a cluſter of ſmall iſlands in the Atlantic, near the coaſt of Spain. N. lat. 43° 23′. W. long. 8° 50′.

ISLE, L', a town of France, in the department of the Tarn, and chief place of a canton, in the diſtrict of Gaillac; five miles S.W. of Gaillac. The place contains 5402, and the canton 6715 inhabitants, on a territory of 82½ kilometres, in 3 communes.—Alſo, a town of France, in the department of Vaucluſe, and chief place of a canton, in the diſtrict of Avignon. The place contains 5155, and the canton 11,099 inhabitants, on a territory of 172½ kiliometres, in 10 communes.

Isle-*Adam, L'*, a town of France, in the department of the Seine and Oiſe, and chief place of a canton, in the diſtrict of Pontoiſe, 6 miles N.N.E. of Pontoiſe. The place contains 1381, and the canton 11,965 inhabitants, on a territory of 147½ kiliometres, in 23 communes.

Isle-*Bouchard, L'*, a town of France, in the department of the Indre and Loire, and chief place of a canton, in the diſtrict of Chinon, ſurrounded by the Vienne; 9 miles E.S.E. of Chinon. The place contains 1000, and the canton 10,437 inhabitants, on a territory of 240 kiliometres, in 20 communes.

Isle-*Boudouin, L'*, or *Iſle-Bouen*, a town of France, in the department of the Vendee, ſituated on an iſland of the ſame name, about 5 miles long, on the coaſt; 9 miles N.W. of Challons.

Isle *of Cerf*, a ſmall iſland in the Engliſh channel, near the coaſt of France. N. lat. 48° 53′. W. long. 3° 25′.

Isle-*Dieu, L'*, a town of France, in the department of the Vendee, and chief place of a canton, in the diſtrict of Les Sables d'Olonne. The place contains 1049, and the canton 2053 inhabitants, on a territory of 65 kiliometres, in 2 communes.

Isle-*d'Oueſſant, L'*, a town of France, in the department of Finiſterre, and chief place of a canton, in the diſtrict of Breſt. The place contains 1645 inhabitants, on a territory of 22 kiliometres, in 1 commune.

Isle-*en-Dodan, L'*, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the diſtrict of St. Gaudens; 18 miles N.N.E. of St. Gaudens. The place contains 1100, and the canton 10,832 inhabitants, on a territory of 232½ kiliometres, in 24 communes.

Isle-*Jourdain, L'*, a town of France, in the department of the Gers, and chief place of a canton, in the diſtrict of Lombés, ſituated on the Save; 7 miles E. of Auch. The place contains 4686, and the canton 11,634 inhabitants, on a territory of 262½ kiliometres, in 23 communes. N. lat. 43° 37′. E. long. 1° 10′.—Alſo, a town of France, in the department of the Vienne, and chief place of a canton, in the diſtrict of Montmorillon, 24 miles S.E. of Poitiers. The place contains 448, and the canton 7553 inhabitants, on a territory of 375 kiliometres, in 11 communes. N. lat. 46° 15′. E. long. 0° 25′.

Isle-*ſur-le-Doubs, L'*, a town of France, in the department of the Doubs, and chief place of a canton, in the diſtrict of Baume; 11 miles N.E. of Baume. The place contains 685, and the canton 7048 inhabitants, on a territory of 167½ kiliometres, in 24 communes.

Isle-*ſur-le-Serrein, L'*, a town of France, in the department of the Yonne, and chief place of a canton, in the diſtrict of Avallon. The place contains 478, and the canton 8766 inhabitants, on a territory of 250 kiliometres, in 23 communes.

Isle *des Moins*, an iſland of France, in lake Morbihan, with a tower; 5 miles S.S.W. of Vannes.

Isle *Grande*, or *La Roche*, an iſland in the South Pacific ocean, ſeen by Anthony de la Roche, in 1675. S. lat. 45°.

Isle *Royale*, an iſland on the N.W. ſide of lake Superior, within the territory of the United States, N.W. of the Ohio; about 100 miles long, and, in many places, about 40 broad. The natives ſuppoſe that this and the other iſlands on the lake are the reſidence of the Great Spirit.

Isle *Plate*, a ſmall iſland in the Engliſh channel, near the coaſt of France. N. lat. 48° 53′. W. long. 3° 24′.

Isle *of Dogs Canal*, is the name of a very wide and deep canal for the paſſage of ſhips acroſs the iſthmus called the Iſle of Dogs, in the river Thames, below London, of which an account has been given under the head of that river, in our article Canal, and a plan of the ſame will be found in our plate of *Docks*.

Isle *of Wight*, an inſulated tract of land, ſituated in the Engliſh channel, near the coaſt of Hampſhire, from which it is not more than three miles diſtant at the neareſt point, and to which county it belongs in all political and civil matters. The form of the iſland is that of an irregular lozenge; meaſuring from the eaſtern to the weſtern angle nearly twenty-three miles; and about thirteen from the northern to the ſouthern point: its ſuperficies is computed at 105,000 acres. Through the middle, in the longeſt direction, extends a range of hills, affording excellent paſture for ſheep, and commanding views over every part of the iſle, with the ocean on the ſouth ſide, and the coaſts of Hampſhire on the north. The face of the country is much diverſified; hill and dale, the ſwelling promontory and the lowly glen, appear in quick ſucceſſion to animate, and give intereſt to the proſpects. The land round the coaſt is, in ſome parts, very high, particularly on the ſouth, or back of the iſland, as it is commonly termed; here the cliffs are very ſteep, and vaſt fragments of rock, undermined by the waves, lie ſcattered along the ſhore: on the northern ſide, the ground ſlopes to the water in eaſy declivities, excepting towards the Needles, or weſtern point, where the rocks are bare, broken, and precipitous. The height of the cliffs, of which the Needles form the extreme point, is, in ſome places, ſix hundred feet above the level of the ſea, and when viewed from the diſtance of about a quarter of a mile, have a grand and almoſt ſublime and ſtupendous effect. Theſe cliffs are frequented by immenſe numbers of marine birds; as puffins, razor-bills, willcocks, gulls, cormorants, corniſh-choughs, daws, ſtarlings, and wild pigeons; ſome of which come, at ſtated times, to lay their eggs and breed; while others remain there all the year. The cliffs are in ſome places perpendicular; in others, they project and hang over, in a tremendous manner: the ſeveral ſtrata form many ſhelves; which ſerve as lodgments for the birds, where they ſit in thick rows, and diſcover themſelves by their motions and flight, though not individually viſible. Here are many caverns and deep chaſms, which ſeem to enter far into the rocks; and in ſome places, the iſſuing of ſprings forms ſmall caſcades of rippling water down to the ſea. The country people take the birds that harbour in theſe rocks, by the perilous experiment of deſcending by ropes, which are fixed to iron crows, driven into the ground: thus ſuſpended, they with ſticks beat down the birds as they fly out of their holes. A dozen birds generally yield one pound weight of ſoft feathers, for which the merchants give eight pence; the carcaſes are bought by the fiſhermen at ſixpence per dozen, for the purpoſe of baiting their crab-pots. The rocks, called the Needles, derived their name from a lofty pointed one, reſembling a needle in ſhape, which had been disjointed, with others, from the main land, by the force of the waves: this was 120 feet above the low water mark; but about forty years ago, its baſe having been excavated by the ſea, it fell, and totally diſappeared.

All the higher parts of the iſland are compoſed of an immenſe maſs of calcareous matter, of a chalky nature, incumbent on ſchiſtus, which runs under the whole iſle, and appears, at low water mark, on the coaſt near Mottiſton: this becomes ſo indurated by expoſure to the air, as to make very good whetſtones. The lime-ſtone is burnt for manure;

and in the pits where it is dug for that purpoſe, are found numerous echini, ſharks' teeth, and ammoniæ. Theſe foſſils are particularly abundant in the range of cliffs which forms the ſouthern ſhore; together with bivalve and turbinated ſhells of various deſcriptions: the cornua ammonis are of all ſizes, from one inch to eighteen inches in diameter. A ſtratum of coal diſcovers itſelf at the foot of Bimbridge cliff, and runs through the ſouthern part of the iſle, appearing again at Warden Ledge, in Freſhwater pariſh. On the north ſide of this ſtratum lies a vein of white ſand, and another of fuller's-earth; and on the ſouth ſide is a vein of red ochre.

The ſoils of the iſland are of various kinds; but the moſt prevailing is a ſtrong loamy earth, well adapted for agricultural purpoſes, and extremely fertile. The quantity of grain annually raiſed here, is computed to amount to ſeven or eight times as much as ſufficient for all the inhabitants. The medium produce of wheat, throughout the iſland, is about twenty-one buſhels per acre; of barley and oats about thirty buſhels; and of beans and peas about twenty-eight buſhels: potatoes are very productive, though not greatly in eſteem, and turnips alſo yield a rich increaſe. The meadow lands are extremely fine, and produce from one to three tons of hay per acre. The elevated tracts are moſtly appropriated to paſturing ſheep; the number annually ſhorn is about 40,000; the wool is of the fineſt quality, and in much repute; the breed in general uſe is the Dorſetſhire: about 5000 lambs are ſold annually.

The climate is extremely ſalubrious, and highly favourable to vegetation: its genial qualities, and near approximation, in mildneſs, to more ſouthern regions, may be inſtanced by the profuſion of myrtles, and by the flouriſhing ſtate of a vine-plantation at Appuldercombe. The central parts of the iſle are ſubject to frequent rains; the high range of hills proving a conſtant ſource of attraction to the vapours, and, in the winter months, involving all beneath them in gloom and humidity. The general fertility, however, is ſo little affected, and the vegetation is ſo abundant, that this iſland has often been ſtyled the "Garden of England;" an appellation, perhaps, that is partly ſuggeſted to the mind by the innumerable plants and flowers which grow every where in wild luxuriance; among them are the *ophrys apifera*, or bee-orchis; the digitalis, or fox-glove; and the crithmum maritimum, or rock-ſamphire.

The contiguity of the Portſmouth, and other dock-yards for ſhip-building, has operated to deprive the Iſle of Wight of much of its timber; and even Parkhurſt, or Cariſbrooke foreſt, which includes about 3000 acres of good land, is almoſt deſtitute of trees of any value. The woods of Swainſton are of conſiderable extent; and thoſe of Wooten and Quarr cover a ſuperficies of nearly 1100 acres: the oak and the elm are the moſt flouriſhing trees.

Great variety of fiſh is found on the coaſt, and in conſiderable abundance: thoſe of the cruſtaceous kinds are particularly numerous on the ſouthern ſhores. The lobſter and crab are of uncommon ſize, and peculiar quality; ſome of the former are often taken upwards of ſix pounds weight; the latter ſo abundant on a particular part of the coaſt, that a neighbouring village has obtained the name of Crab-Niton from this circumſtance. Cockles are in high eſtimation; the ſand-eel is alſo very plentiful.

The trade of the Iſle of Wight is flouriſhing; the harbour of Cowes is particularly convenient for ſhipping and unſhipping merchandize. The chief imports are coals, timber, deals, iron, wine, hemp, and fruits: the principal exports are wheat, flour, barley, malt, and ſalt. The chief manufactures are thoſe of ſtarch, hair-powder, and ſalt; and latterly the making of woollens, ſacking, &c. has been carried to ſome extent in the Houſe of Induſtry near Newport.

Several chalybeate ſprings have been diſcovered in different parts of the iſland; one of them, at Black Gang, under Chale cliff, is very ſtrong: about half a mile from this, at Pitland, is a ſpring, impregnated with ſulphur; and at Shankin is a ſpring, the waters of which are ſlightly tinctured with alum. Springs of clear water are very numerous, and in general extremely pure and tranſparent, from the natural percolation which they undergo through the lime-ſtone ſtrata.

The principal rivers are the Medina, the Yar, and the Wooten. The Medina, anciently called the Mede, riſes near the bottom of St. Catherine's Down, and flowing directly northward, divides the iſland into two nearly equal parts; gradually widening in its courſe, it paſſes to the eaſt of Newport, and in Cowes harbour unites its waters with the ocean. Numerous ſmaller ſtreams alſo exiſt; and various creeks and bays run up from the ſea. The two diviſions of the iſland are called the hundreds, or liberties, of Eaſt and Weſt Medina, from their relative ſituations to that river. They contain thirty pariſhes, in which are comprehended the following boroughs and towns; Brading, Newport, Newtown, and Yarmouth; the three latter of which return ſix members to parliament.

The ancient hiſtory of this iſland has been a ſubject of much controverſy with topographical writers. Whitaker, in his Hiſtory of Mancheſter, contends that it was formerly connected with the main land; and that it is the Ictis of Diodorus Siculus. At this port, according to the latter writer, the Britons ſhipped their tin for Gaul; but the original tin ſtaple of Britain was certainly the Caſſiterides, or Scilly iſlands. (See Borlaſe and Heath's Accounts of theſe Iſlands.) During the Anglo-Roman dynaſty this iſland was called *Vectis*; but it does not appear that the Romans had any ſtation or ſettlement here; though they had two or three conſiderable ſtations on the oppoſite coaſt; one at Clauſentum, near Southampton, and another at Port-cheſter. Suetonius, the firſt of the Roman authors, who notices the iſland under conſideration, ſtates, that it was ſubdued in A.D. 43 by Veſpaſian. Cerdic, a Saxon chieftain and founder of the kingdom of Weſſex, made a ſecond conqueſt of the iſle, and appointed his nephews Sterff and Withgar to govern the inhabitants. In the year 661 it was again ſubdued by Wulphure, king of Mercia, but this monarch was diſpoſſeſſed of this tract of land within the ſpace of 15 years. The Daniſh marauders afterwards viſited, and took poſſeſſion of this iſland; and preſerving a port here, they made frequent deſcents on the coaſts of Hampſhire, Dorſetſhire, and Suſſex. After the Norman conqueſt, the iſland was annexed to the crown, and was frequently granted, in truſt, to the favourites of different monarchs.

A liſt of the different noblemen who were governors, or lords of the iſland, with the conditions on which it was held, are fully narrated in ſir Richard Worſley's Hiſtory of the Iſle of Wight. The ſituation of this iſland has rendered it liable to invaſions in the time of warfare, and particularly when France has been at war with England, and many inſtances are recorded of deſcents on this coaſt. To protect the iſland, a large and ſtrong fortreſs, called Cariſbrooke caſtle, was conſtructed at an early period, and has been preſerved as a place of refuge and ſtrength even to the preſent time. Here a military governor occaſionally reſides. Other forts were conſtructed on different parts of the coaſt; but the great fortifications at Portſmouth, and at other places on the Hampſhire coaſt, ſerve to guard the iſland. The ſouthern ſhore is alſo naturally protected by rocks. The iſland contains ſeveral ſeats and villas, the principal of which is Appuldercombe park. Sir Richard Worſley's Hiſtory of the Iſle of Wight, 4to. Albin's Hiſtory, &c. 8vo. Buller's Account of the Iſland, 12mo. Windham's Picture of the Iſle of Wight.

Isle *of Wight*, a county of Virginia, on the S. ſide of James's river, W. of Norfolk county, about 40 miles long and 15 broad, containing 5313 free inhabitants, and 4029 ſlaves. In this county is a mineral ſpring, to which many perſons reſort. It is ſituated about 10 miles from Smithfield, and 12 from Suffolk.

ISLEBEIANUS Lapis, in *Natural Hiſtory*, a name given by authors to a kind of blackiſh ſlate, very heavy, not very hard, and eaſily ſplitting into thin flakes. It is dug near Iſleb, in Thuringia, whence it has its name, and is much of the nature of that ſort of black ſlate which we have common in England, lying over the coal ſtrata.

As our ſlate of this kind contains uſually leaves of fern and other plants, this foreign kind contains the impreſſions of ſeveral kinds of fiſh, ſo exactly delineated in ſhape, and with the fins, ſcales, and all other parts ſo perfect, that the ſpecies are eaſily known. All theſe impreſſions and delineations are, however, ſo flat and thin, and have taken up ſo little room in the ſtone, that they ſeem rather to have been the ſkins and exuviæ of fiſh than the whole bodies of them; but this is not wonderful when we conſider how eaſily the bodies, and even the bones of fiſhes may be diſſolved; and that theſe exuviæ are lodged in a ſubſtance which contains a vitriolic ſalt, very capable of effecting ſuch a ſolution. It is eaſy to conceive, that this and other ſuch ſalts, while in a ſtate of ſolution in water, before the concretion of the matter of this ſtone into a hard maſs, might make that water a menſtruum capable of thus diſſolving the bodies and bones of fiſhes, while the outer ſkin and ſcales being much tougher, and of a very different nature, might eſcape the effects of them. It is well known that the fins and ſcales, and other external parts of fiſh, are much more capable of bearing maceration in water than the internal ſubſtances of them; and it is eaſy to conceive that theſe, after having withſtood that power in the water, would at length ſubſide down among the muddy matter that was to form ſome of the ſtrata of this ſlate: the motion of the water would not fail to expand their ſkins, though ever ſo thin, into the true and exact ſhape of the whole fiſh; and when thus laid along upon the ſurface of the new-formed ſtratum, the next quantity of the ſame matter that ſubſided would form another ſtratum, which falling evenly upon the former, would cover it, and on the following concretion of both, the figure of the fiſh would be beautifully preſerved between two plates or flakes of a fiſſile ſtone.

It is very remarkable, that as in theſe ſlates of Iſleb preſerving fiſhes, the external parts only are preſerved, the bones and fleſh being waſted: ſo, on the other hand, in thoſe foſſile fiſhes brought from Syria, the ſkins and ſcales are wanting, and the ſkeletons are principally the part preſerved. In ſome of theſe the bones are not clean, ſmall parcels of the fleſh being found petrified among them; but this fleſh is ſtripped of the ſkin. The ſtone in which theſe Syrian fiſhes are preſerved is alſo very different from the Iſleb ſlate, being whitiſh or greyiſh, and very hard. The ſtones of this kind found on mount Libanus, where they are very common, have very fine delineations of the ſtar-fiſh complete. Woodw. Cat. Foſſ. vol. ii. p. 23, &c.

ISLEBIANS, in *Eccleſiaſtical Hiſtory*, a name given to thoſe who adopted the ſentiments of a Lutheran divine of Saxony, called John Agricola, a diſciple and companion of Luther, a native of Iſleb, whence the name; who, interpreting literally ſome of the precepts of St. Paul with regard to the Jewiſh law, declaimed againſt the law, and the neceſſity of good works. See Antinomians.

ISLEBOROUGH, in *Geography*, a townſhip of America, in Hancock county, Maine, formed by Long iſland, in the centre of Penobſcot-bay; 15 miles long, and from two to three broad: it was incorporated in 1789, contains 483 inhabitants, and is diſtant 260 miles N.E. by N. from Boſton.

ISLES *de Madame*, iſlands that lie at the S. end of Sydney, or Cape Breton iſland, on which they are dependent. The largeſt of theſe, with Cape Canſo, the E. point of Nova Scotia, forms the entrance of the gut of Canſo from the Atlantic ocean.

Isles *of Don Joſeph Galwez*, a large cluſter of iſlands in the South ſea, populous, and affording plenty of potatoes, cocoa, bananas, and other fruits. S. lat. 19° 39′. E. long. 179° 38′ from Paris.

Isles, in *Architecture*, the ſides or wings of a building.

ISLEWORTH, in *Geography*, a pariſh in the hundred of the ſame name, and county of Middleſex, England, is delightfully ſeated on the banks of the Thames, and has long been the reſidence of many perſons of rank and fortune. The pariſh conſiſts of about 2370 acres, chiefly appropriated to arable and paſture; but nearly 500 acres are uſed as gardens and nurſery-grounds. At Baberbridge, in this pariſh, are ſome large copper and braſs mills, rented by the ſociety of the mines-royal. A conſiderable china manufactory, ſome extenſive calico-grounds, and two large flour-mills are alſo within this pariſh. The chief buſineſs, or trade of the place, is derived from the gardens, which furniſh a vaſt variety of fruit and vegetables for Covent-garden market. In the year 1794, ſir Joſeph Banks obtained a correct ſtatement of the population of this pariſh: and it appeared that the number of houſes was 712; of which 43 belonged to gentlemen, 6 to farmers, 26 to publicans; the remainder conſiſted of ſhops and cottages. The inhabitants at the ſame time amounted to 4190. In the year 1800, the houſes amounted to 768, and inhabitants to 4346. The principal building in this pariſh is Sion-houſe, a ſpacious ſeat of the duke of Northumberland. The houſes occupy the ſcite of a convent of Bridgetines, founded by king Henry V. The preſent manſion was enlarged and fitted up by the late duke, who embelliſhed it with ſeveral pieces of ancient ſculpture, alſo with twelve Ionic columns, and ſixteen pilaſters of fine marble. The improvements made in the houſe, and the elegant façade, adjoining the public road near Brentford, are from deſigns by the late Mr. Adams. The gardens and pleaſure-grounds, contiguous to the Thames, were laid out by the late Mr. Brown. The duke of Marlborough and the earl of Shrewſbury have ſeats in this pariſh. Iſleworth Park was occupied by the barons' army, headed by Simon de Montford, in the year 1263. On the 4th of Auguſt, 1647, general Fairfax appointed his head-quarters at Iſleworth, and received the parliamentary commiſſioners here. Lyſons's Environs of London and Middleſex Pariſhes.

ISLINGTON, a village in Oſſulſton hundred, Middleſex, England, though formerly a ſmall place, and ſeparated from London by ſeveral intervening fields, is now connected to the northern ſuburbs of the metropolis, and indeed appears to form a part of this vaſt city. "When it is conſidered, that Iſlington is ſcarcely two miles from the centre of the original London; that it is ſeated upon the Ermin-ſtreet, of the Romans, and the ſpot where they had a military poſt; alſo, that it has, from the earlieſt period of our hiſtory, been celebrated for the richneſs of its paſtures, and the excellent produce of its dairies, there can remain little doubt that theſe circumſtances muſt have rendered it of conſiderable importance to the Londoners, as well as the garriſon there." This village has been variouſly ſpelt in old records and publications; as Iſendune, Iſendon, Iſeldon, Yſeldon, and Eyſeldon: but it appears that the preſent name has prevailed from the cloſe of the 16th century. The pariſh of Iſlington is three miles two furlongs in length, from N.W. to S.E., and two miles one furlong in breadth. It conſiſts of 3032 acres three roods, of which the chief part is appropriated to paſture. Beſides the village of Iſlington, the pariſh contains the following hamlets: Holloway, Balls-pond, Battle-bridge, the City-gardens, Kingſland-green, and great part of Newington-green. The population of this pariſh, in 1800, was returned at 10,212, occupying 1663 houſes: in 1793, the latter was only 1200, and the former 6600: whereas, in 1810, the population has increaſed to 14,000. Previous to the year 1714, the roads and highways were in ſo bad a ſtate, that in an act of parliament then paſſed, they are deſcribed to be "very ruinous and almoſt impaſſable for the ſpace of five months in the year." This furniſhes a curious illuſtration of the amazing improvements made for public accommodation within 100 years: for now foot-paſſengers are provided with good pavements, or gravel paths, and the public roads are firm, even, and generally clean. They are alſo furniſhed with lamps for winter, and watchmen and patroles are employed to protect houſes and paſſengers. From an early period, even before the time of Henry II., Iſlington has been noted as a place of recreation for the citizens of London; where wreſtling-matches, ſhooting, archery, caſting the ſtone, and other athletic paſtimes were purſued. Now the mechanics and lower claſſes frequent public-houſes, which are provided with grounds for ſkittles and Dutch-pins; places for playing at fives, cricket, and bowls. In this pariſh, to the north of White Conduit-houſe, are the traces of an encampment, which ſeveral writers have attributed to the Romans, but neither its preſent ſtate, nor any diſcoveries that have been made, juſtify this opinion. Iſlington contains ſeveral commodious, and ſome handſome houſes belonging to London merchants and tradeſmen.

For a full and circumſtantial hiſtory and deſcription of this pariſh, the reader is referred to "The Hiſtory, Topography, and Antiquities of Iſlington," by John Nelſon, 4to. 1811.

ISLIP, a poſt-town of New York, in Suffolk county, Long iſland, E. of Huntington, containing 958 inhabitants.

ISMADABS, a town of Japan, in the iſland of Niphon; 125 miles N.W. of Jedo.

ISMAELPOUR, a town of Hindooſtan, in Bahar; 38 miles S.W. of Patna.—Alſo, a town of Bengal; ſix miles E. of Boglipour.

ISMAIL, or Ismailow, a town of European Turkey, in the province of Beſſarabia, ſituated on the N. ſide of the Danube, about 33 miles from the Black ſea. The town meaſures about a mile toward the land, and half a mile by the ſide of the Danube, and was fortified by eight baſtions. The ramparts are in general 18 feet high, and in ſome places 25. The moat is from 30 to 40 feet deep, and at an intermediate diſtance between the polygons named Bender and Broek was a falſe trench. Near the town was a cavalier of ſtone-work, capable of holding ſome thouſand men. The ſide next the water was defended by ramparts and horizontal batteries. This place was taken by ſtorm, December 22, 1790, by the Ruſſians, under general Suwarrow. It is ſaid, that after the Turks had ſurrendered, the garriſon was put to death, and 30,000 men maſſacred in cold blood; the town was given up to the unreſtrained brutality of the victorious army. The booty found in the place was immenſe: 144 miles S.W. of Otchakov. N. lat. 45° 23′. E. long. 29° 45′.

ISMANING, a town of Bavaria, which gives name to a county, ſituated on the Iſer; eight miles N.N.E. of Munich.

ISMENIAS, in *Biography*, one of the moſt celebrated performers on the flute in antiquity, was a native of Thebes; and not leſs renowned for ſplendour, extravagance, and caprice, than for his ſkill in muſic. Having been taken priſoner by Atheas, king of the Scythians, he performed on the flute before this rude monarch; but though his attendants were charmed ſo much that they applauded him with rapture, the king laughed at their folly, and ſaid that he preferred the neighing of his horſe to the flute of this fine muſician.

Ælian tells us, that he was ſent ambaſſador into Perſia. Lucian, that he gave three talents, or 581*l.* 5*s.* for a flute at Corinth. Antiſthenes, not very partial to muſic, ſaid he was ſure that Iſmenias was a worthleſs fellow, by his playing ſo well on the flute. Plutarch relates the following ſtory of Iſmenias: being ſent for to accompany a ſacrifice, and having played ſome time without the appearance of any good omen in the victim, his employer became impatient, and, ſnatching the flute out of his hand, began playing in a very ridiculous manner himſelf, for which he was reprimanded by the company; but the happy omen ſoon appearing, there! ſaid he, to play acceptably to the gods, is their own gift! Iſmenias anſwered with a ſmile, "While I played, the gods were ſo delighted, that they deferred the omen, in order to hear me the longer; but they were glad to get rid of your noiſe upon any terms." Thus we ſee that neither vanity nor impiety is peculiar to modern muſicians.

The ſame author, in his life of Demetrius, informs us, that Iſmenias uſed to inſtruct his pupils by examples of excellent and execrable performance; letting them hear, immediately after each other, a good and a bad player on the flute; ſaying of the firſt, "this is the way you *ſhould* play;" and of the ſecond, "this is the way you ſhould *not* play." He is recorded by Pliny as a prodigal purchaſer of jewels, which he diſplayed with great oſtentation. Being at Cyprus, he found at a jeweller's an engraved emerald of the moſt exquiſite kind, repreſenting the princeſs Amyona, one of the daughters of Danaus, for which the jeweller aſked him five talents, with which demand Iſmenias immediately complied. But the jeweller, aſtoniſhed at his facility, and expecting that an abatement would have been required, offered, conſcientiouſly, to return two of the five talents; but the magnificent muſician refuſed to take them; ſaying, that it would for ever diminiſh the value of the gem. Upon this principle it ſeems as if the purchaſers of ſcarce books were fearful of acquiring them cheap; as their value is often more heightened by their price and margin than contents. And we are convinced that the innumerable crowds who flocked to the Pantheon in 1775, when the Agujari firſt ſung there, were not occaſioned by her merit or celebrity as a ſinger, but by her having 100*l.* a night for her performance; and who knows but that Mrs. Billington's high ſalaries may have contributed to her attractions, as well as her extraordinary talents?

ISMID, or Is Nickmid, in *Geography*, a town of Aſiatic Turkey, ſituated on a bay of the ſea of Marmora; where the Greeks and Armenians have each a church and an archbiſhop. This is ſuppoſed to have been the ancient Nicomedia,

media, the capital of Bithynia; 45 miles E.S.E. of Conſtantinople. N. lat. 40° 39′. E. long. 29° 34′.

Ismid, a town of Aſiatic Turkey, in Caramania; 24 miles E S.E. of Cogni.

ISMIL, a town of Aſiatic Turkey, in Caramania; 30 miles E. of Cogni.

ISMOKIL, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 16′. E. long. 21° 20′.

ISNAGAR, or Isñajar, a town of Spain, in the province of Cordova, 10 miles S. of Lucena.

ISNARDI, in *Biography*, according to M. Laborde, "after ſinging, in his youth, on the ſtage with ſucceſs, quitted the theatre, and ſtudied compoſition and poetry. After which he publiſhed ſonnets, madrigals, and even ſhort dramas, ſet to muſic by himſelf. His works have been often reprinted." Now if Walther's dates are correct, and he gives authorities for them, Iſnardi muſt have ſung with ſucceſs on the ſtage before the lyric ſtage or operas had exiſtence; but we are unable to find a muſician of this name.

ISNARDIA, in *Botany*, was ſo named by Linnæus, in honour of M. Antoine Danti d'Iſnard, member of the Academy of Sciences, in the Memoires of which academy may be found ſeveral of his tracts on botany, publiſhed between the years 1716 and 1726.—Linn. Gen. 61. Schreb. 84. Willd. Sp. Pl. v. 1. 680. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. v. 1. 266. Juſſ. 333. Lamarck. Illuſtr. t. 77.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Salicariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, bell-ſhaped, permanent, divided into four, ſlightly ſpreading ſegments. *Cor.* none. *Stam.* Filaments four, ſhorter than the calyx, one placed within each ſegment of it; anthers ſimple. *Piſt.* Germen inferior; ſtyle cylindrical, longer than the ſtamens; ſtigma capitate. *Peric.* Capſule ſquare, of four cells, crowned by the calyx. *Seeds* numerous, oblong.

Eſſ. Ch. Corolla none. Calyx four-cleft. Capſule of four cells, crowned by the calyx.

Obſ. Linnæus has obſerved, in a MS. note to his own copy of the *Genera Plantarum*, that the baſe of the calyx is furniſhed with two awl-ſhaped bracteas adhering cloſely together.

1. I. *paluſtris*. Linn. Sp. Pl. 175. (Glaux major paluſtris, flore herbaceo; Bocc. Muſ. 105. t. 84. f. 2.) A native of rivers in France, Ruſſia, Jamaica, North America, &c. It flowers in July, and was firſt introduced at Kew by Dr. Fothergill, in 1776.—"In general appearance this plant greatly reſembles *Peplis Portulaca*. It is creeping and floating. *Flowers* axillary, oppoſite, ſeſſile, green."—*Leaves* obovate, wedge-ſhaped at the baſe, veined and ſmooth. *Seeds* brown.—Swartz has deſcribed a plant in his *Fl. Ind. Occ. v.* 1. 273, under the name of *Ludwigea repens*, which he ſays differs only from *Iſnardia paluſtris* in being furniſhed with petals.

ISNARI, Paolo, of Ferrara, in *Biography*, a diſciple of the celebrated muſician Manara, maeſtro di cappella of the Duomo in that city, and a voluminous compoſer of church muſic, flouriſhed in the latter end of the ſixteenth century. In 1565, he publiſhed his "Cantus Hebdomadæ Sanctæ," or Muſic for Paſſion Week: in 1568, ſix-part maſſes: in 1578, the Veſper pſalms in three parts, and three Magnificats in four parts. This laſt work was reprinted at Milan, 1590.

ISNELLO, in *Geography*, a town of Sicily, in the valley of Demona; 13 miles S. of Cefalu.

ISNIK, a town of Aſiatic Turkey, in Natolia, ſituated on a lake of the ſame name, called by the ancients Aſcanius, that abounds with fiſh, and that communicates with the ſea of Marmora. The chief article of its trade is ſilk. It is the ſee of a Greek archbiſhop, though it contains ſcarcely 300 houſes. It was anciently called "Nice," and famous for its council; 60 miles E. of Conſtantinople. N. lat. 40° 16′. E. long. 29° 50′.

ISNY, or Ysni, a town of Germany, lately imperial, ſituated in the Algau, betwixt the counties of Hoheneck and Trauchburg, and the lordſhip of Eglof. The magiſtrates and greateſt number of the citizens are Lutherans. It has often ſuffered by fire; 40 miles S. of Ulm. N. lat. 47° 45′. E. long. 9° 58′.

ISOCHRONAL, or Isochronous, is applied to ſuch vibrations of a pendulum, as are performed in equal times.

Of which kind are all the vibrations or ſwings of the ſame pendulum, whether the arcs it deſcribes be longer or ſhorter; for when it deſcribes a ſhorter arc, it moves ſo much the ſlower; and when a long one, proportionably faſter. See Pendulum.

Isochronal *Line*, is that wherein a heavy body is ſuppoſed to deſcend without any acceleration.

Leibnitz, in the Act. Erud. Lipſ. for April 1689, has a diſcourſe on the *linea iſochrona*, in which he ſhews, that a heavy body, with a degree of velocity acquired by its deſcent from any height, may deſcend from the ſame point by an infinite number of iſochronal curves, which are all of the ſame ſpecies, differing from one another only in the magnitude of their parameters; ſuch as are all the quadrato-cubical paraboloids, and conſequently ſimilar to one another. He ſhews alſo how to find a line, in which a heavy body deſcending, ſhall recede uniformly from a given point, or approach uniformly to it. See Cycloid.

ISOCHRONOUS Parcels, in *Muſic*. Mr. John Holden labours in his "Eſſay towards a rational Syſtem of Muſic," to eſtabliſh it as a principle, that "there is a certain propenſity in our mind to be ſubdividing the large numbers (of equal and equidiſtant objects) into ſmaller equal parcels: or, as it may be juſtly called, compounding the large numbers of ſeveral ſmall *factors*, and conceiving the whole by means of its parts," p. 288. "Seven, we conceive, as two threes diſjoined, and one in the middle; five becomes two twos diſjoined, and one in the middle," p. 289; and again, p. 305, "we readily conceive five by its affinity to four, and ſeven by its affinity to ſix," p. 292. "Among the iſochronous ſingle vibrations of muſical ſounds, the mind naturally ſeeks to conſtitute iſochronous compound parcels."—"The ſize or magnitude of a muſical interval is eſtimated by the *inequality* of the iſochronous parcels of vibrations of its two terms; and in proportion as their iſochronous parcels differ more from equality, the included interval becomes greater," p. 327. The above extracts ſhew the nature and uſes to which this author attempts to apply his iſochronous parcels of vibrations; in which we can ſcarcely admit him to have been more ſucceſsful, than in the application of the Grave *Harmonics* (ſee that article), or Tartinian ſounds, to accounting for the conſtitution of the muſical ſcale; the incongruous ſyſtem of intervals to which theſe fancies lead, will be ſeen in our article Holden's *Syſtem of Muſical Intervals*.

ISOCRATES, in *Biography*, a celebrated Greek rhetorician, was born at Athens about the year 436 B. C. He received a good education, but his father, being ruined by the Peloponneſian war, left him no other inheritance. He had ſtudied under Gorgias, Prodicus, and other great maſters of eloquence, but the weakneſs of his voice, and his want of a proper degree of confidence, prevented him from exerciſing the talent of ſpeaking in public. He employed himſelf, therefore, in compoſing diſcourſes in his cloſet, and in teaching the art of rhetoric. He was the inſtructor of Timotheus, ſon of Conon, whom he afterwards accompanied to ſeveral parts of Greece as his ſecretary. He had numerous ſcholars at Athens, and was amply remunerated for ſome of his writings, particularly for a diſcourſe which he addreſſed to Niocles, king of Cyprus, for which he received a ſum equal to between four and five thouſand pounds of our money. Though courted by the great, he had an ardent mind in defence of what was juſt and right. When Theramenes, proſcribed by the thirty tyrants, took refuge at the altar, he pleaded in his defence, at the hazard of ſharing his fate; and after the death of Socrates, when all his diſciples took flight, he dared appear in mourning in the public ſtreets of Athens. He paſſed a long life in peace and honour, and had reached his ninety-eighth year at the fatal battle of Cheronæa, when, unable to bear the calamity which had befallen his country, he abſtained from all ſuſtenance for four days, and expired. It was mentioned, to his praiſe, that he never, by writing or accuſation, injured a ſingle individual. A ſtatue of bronze was raiſed to his memory by Timotheus, and another by his adopted ſon Aphareus. The ſtyle of Iſocrates is pure, ſweet, and flowing: he was extremely attentive to the harmony of his periods, and he is reckoned by Cicero as the firſt who introduced into Greek proſe that melody of which it is ſuſceptible. He ſpent a deal of time in poliſhing his compoſitions; his panegyric on Athens is ſaid to have coſt him ten years labour. Twenty-one of his diſcourſes remain, which have been diſtributed into the moral, the deliberative, the panegyrical, and the agoniſtical. Moreri.

ISOETES, in *Botany*, an old name for one of the ſmaller kinds of *Sedum*, from ισος, *equal*, and ετος, *the year*, as being evergreen. It is for the ſame reaſon adopted by Linnæus for the preſent genus. Linn. It. Scan. 417. t. 419. Gen. 561. Schreb. 755. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 1144. Juſſ. 17. Lamarck Dict. v. 3. 314. Illuſtr. t. 862. (Calamaria: Dill. Muſc. 540. t. 80. f. 1.) Claſs and order, *Cryptogamia Filices*. Nat. Ord. *Filices*.

Gen. Ch. Male, *Flowers* ſolitary, within the baſe of the inner leaves. *Cal.* a heart-ſhaped, acute, ſeſſile ſcale. *Cor.* none. *Stam.* Filament none; anther roundiſh, of one cell, compreſſed, convex on one ſide, concave on the other, ſtanding on the calyx.—Female, *Flowers* ſolitary, within the baſe of the outer leaves of the ſame plant. *Cal.* as in the male. *Cor.* none. *Piſt.* Germen ovate, ſtanding on the calyx, within the leaf; ſtyle none; ſtigma . . . *Peric.* Capſule membranous, nearly ovate, concealed within the baſe of the leaf. *Seeds* numerous, angular, rough.

Eſſ. Ch. Male within the baſe of the inner leaves. Anthers ſolitary, ſtanding on the heart-ſhaped calyx. Female within the baſe of the outer leaves. Germen ſtanding on the heart-ſhaped calyx. Capſule membranous. Seeds many, angular, rough.

1. I. *lacuſtris.* Common Quillwort.—Linn. Sp. Pl. 1563. Engl. Bot. t. 1084. Bolt. Fil. 74. t. 41. (Subularia vulgaris erecta, folio rigidiſſimo; Raii Syn. 306.)—Fronds awl-ſhaped, ſemi-cylindrical, rather ſpreading. Capſules roundiſh, of two cells. Seeds granulated all over.—Found under water, about the margins of alpine lakes in various parts of Europe. In thoſe of Wales, Scotland, and Weſtmoreland, it is abundant, making a ſort of coarſe evergreen turf, much below the ſurface. The *root* is perennial, tuberous, throwing out many long ſimple fibres. *Leaves* or *fronds* numerous, tufted, ſimple, awl-ſhaped, from three to twelve inches high, rather ſpreading upwards, and often recurved, ſemi-cylindrical, ſmooth, divided internally into four longitudinal cells or tubes, with numerous tranſverſe partitions. The baſe of each leaf is ſomewhat dilated, and bordered with a membrane, the *fructification* being ſituated on the inner ſide, under the cuticle, that of the inner leaves being male, the outer female. What ſupports the anther in one flower, the germen in another, may be termed either a calyx or receptacle. The ripe *capſule* is nearly as large as a ſplit pea, browniſh, thin, and membranous; we find it divided into two cells by a tranſverſe ſtricture or partition, notwithſtanding what Schreber has mentioned to the contrary, apparently from Oeder. The *ſeeds* are numerous, ſmall, white, rough all over with minute granulations.

2. I. *ſetacea.* Slender Quillwort. Lamarck Dict. v. 3. 314.—Fronds briſtle-ſhaped, nearly round, erect.—Lamarck mentions this as very different from the former in the ſlenderneſs and ſtraightneſs of its *leaves*, which are only about 2½ inches high. The *root* alſo is entirely fibrous, not tuberous. It was found by the abbé Bonnaterre, growing three or four feet under water, in the lake of St. Andréol, on the mountains of Aubrac, in Gévaudan. We have had no other tidings of this ſpecies, but ſhould expect to find it in Britain.

3. I. *unilocularis.* Indian Quillwort.—Roxb. MSS.—Fronds ſomewhat triangular, erect. Capſules elliptical, of one cell. Seeds granulated on one ſide, triangular on the other.—Sent from the coaſt of Coromandel by Dr. Roxburgh. Koenig ſent what appears certainly to be the ſame, in a younger ſtate, to Linnæus by the name of *I. indica*, as found in ponds on a ſandy ſoil, in December. In theſe latter ſpecimens the *root* of each is a globoſe tuber. *Fronds* about ſix, erect, ſtraight, ſlender, obſcurely triangular, with a broad membranous baſe. *Fructification* too young to be diſcernible. Dr. Roxburgh's ſpecimens conſiſt of ſeparate *fronds*, larger than the former, as being more advanced, but otherwiſe exactly ſimilar, the baſe of each winged with a broad membrane, and lodging an elliptical, ſlightly compreſſed, membranous, browniſh *capſule*, from above half an inch to near an inch long, of one cell, whoſe inſide is lined with innumerable compreſſed membranous ſtalks, each bearing a beautiful white *ſeed*, convex and granulated below, triangular and ſmooth above. A ſpongy body, above the capſule, but, in our ſpecimens, disjointed from it, is lodged in the ſubſtance of the leaf, and the ſame is indicated by the figure of the firſt ſpecies in Engl. Bot. in both male and female flowers, as well as by Linnæus in his *Iter Scanicum*. Having never had an opportunity of tracing the progreſs of the fructification, we are not certain whether this be the part called ſometimes calyx, ſometimes receptacle, but if ſo, the capſule is reverſed. S.

ISOLA, in *Geography*, a town of Naples, in Calabria Ultra, the ſee of a biſhop, ſuffragan of St. Severina, from which it is diſtant S.E. 15 miles. N. lat. 39° 4'. E. long. 17° 24'.—Alſo, a town of Iſtria, ſeated on an iſthmus which extends far into the ſea, the environs of which are celebrated for wine; 7 miles S. of Capo d'Iſtria. N. lat. 45° 37'. E. long. 13° 40'.

Isola *Alta*, a town of Italy, in the department of the Mincio; 11 miles N.N.E. of Mantua.

Isola *de Dovareſi*, a town of Italy, in the department of the Upper Po, on the Oglio; 12 miles N.E. of Cremona.

Isola *Poccarizza*, a town of Italy, in the department of the Mincio; 18 miles N.E. of Mantua.

Isola *Groſſa*. See Grossa.

Isola *delle Femine*, a ſmall iſland near the W. coaſt of Sicily, which was formerly a place of baniſhment for women.

Isola *Sacra*, a ſmall iſland at the mouth of the Tiber, near Oſtia.

Isola *delle Scala*, a town of the Veroneſe; 13 miles S. of Verona.

ISOLACCIO, a town of the iſland of Corſica; 38 miles N. of Porto Vecchio.

ISOLEPIS, in *Botany*, from ισος, *equal* or *uniform*, and λεπις, a *ſcale*, a genus ſeparated from *Scirpus* by Mr. Brown, in his Prodr. Nov. Holl. v. 1. 221, on account of the want of briſtles at the baſe of the germen or ſeed, by which alone it is diſtinguiſhed; a mark, if conſtant, certainly ſufficient in ſo difficult a tribe. Twelve New Holland ſpecies are defined by this author, amongſt which are *Scirpus fluitans*, *ſupinus*, *ſetaceus*, and *capillaris* of Linnæus; *nodoſus* and *prolifer* of Rottboll; with ſix never before deſcribed.

ISOLETTA, in *Geography*, a town of Italy, in the department of the Mela; 15 miles S. of Breſcia.

ISOMERIA, formed of ισος, *equal*, and μερις, *part*, in *Algebra*, a method of freeing an equation from fractions, by reducing all the fractions to one common denominator, and then multiplying each member of the equation by that common denominator.

This amounts to the ſame with what is otherwiſe called converſion of equations. See Conversion *of Equations*.

ISONA, in *Geography*, a town of Spain, in Catalonia; 24 miles N. of Balaguer.

ISONEMA, in *Botany*, from ισος, *equal*, and νημα, *a thread* or *ſtamen*. Brown. Mem. of the Wernerian Society, v. 1. 63.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Brown.

Eſſ. Ch. Corolla ſalver-ſhaped; its mouth and tube without ſcales; limb in five deep ſegments. Stamens prominent; filaments inſerted into the mouth, ſimple at the top; anthers arrow-ſhaped, adhering to the ſtigma by their middle part. Germens two; ſtyle one, thread-ſhaped; ſtigma thick, obtuſe. No ſcales beneath the germen. Pouches . . .

The above characters are taken from a ſhrub gathered on the African coaſt, near Sierra Leone, by Smeathman, and preſerved in the Bankſian herbarium. It is hairy, apparently erect, with oppoſite *leaves*. *Panicle* terminal, oppoſitely divided, corymboſe. Leaves of the *calyx* with a double ſcale at their baſe on the inſide. Tube of the *corolla* half an inch long, cylindrical, bearded in the middle within. Brown.

ISOPERIMETRY, in *Mathematics*, is a branch of the higher geometry, which treats of the properties of iſoperimetrical figures, *viz.* of ſurfaces contained under equal perimeters; of ſolids under equal ſurfaces; curves of equal lengths, &c. Of the foregoing heads, the two firſt may be conſidered as containing the elements of the ſcience, which relate principally to the *maxima et minima* of different ſurfaces and ſolids, when bounded by figures of equal perimeters, but of a greater or leſs number of ſides, and poſited in a different order. The other part, which relates to the *maxima et minima* of curves, treats of problems of another kind, and of the moſt difficult nature which have engaged the attention, and exerciſed the talents, of many of the greateſt mathematicians of modern times; as Newton, Leibnitz, the Bernouillis, Euler, Lagrange, &c. and gave riſe to many warm and even rancorous diſputes, particularly between the brothers John and James Bernouilli, which we ſhall mention more particularly in the ſubſequent part of this article, after having given a ſlight hiſtorical ſketch and view of the more elementary parts of this intereſting branch of mathematical inquiry.

The problems in which it is required to find, among figures of the ſame or different kinds, thoſe which, within equal perimeters, ſhall comprehend the greateſt ſurfaces, and thoſe ſolids which, under equal ſurfaces, ſhall contain the greateſt volume, had long engaged the attention of mathematicians before the invention of fluxions, and different methods had been deviſed for the ſolution of them by Des Cartes, Fermat, Sluze, Hudde, and others; but theſe were all ſupplanted by the ſimplicity and generality of the new analyſis; after which time the elements of the ſcience ſeem to have been loſt ſight of by mathematicians, who were all engaged in the ſolution of the higher order of iſoperimetrical problems.

Simpſon was the firſt who condeſcended to treat of the more elementary parts of this ſcience, by giving, in his Geometry, a very intereſting chapter on the maxima and minima of geometrical quantities, and ſome of the ſimpleſt problems concerning iſoperimeters. The next who treated the ſubject in an elementary manner was Simon L'Huillier of Geneva, who, in 1782, publiſhed his treatiſe "De Relatione mutua Capacitatis et Terminorum Figurarum," &c. His principal object in the compoſition of that work was to ſupply the deficiency in this reſpect, which he found in moſt of the elementary courſes, and to determine, with regard to both the moſt uſual ſurfaces and ſolids, thoſe which poſſeſs the minimum of contour with the ſame capacity; and reciprocally, the maximum of capacity with the ſame boundary. Legendre has alſo conſidered the ſame ſubject, in his "Elemens de Géométrie;" Dr. Hutton, in his "Courſe of Mathematics;" and Dr. Horſley, in the Philoſophical Tranſactions, vol. lxxv. for 1775.

Elements of Iſoperimetry.

Proposition I.—Of all triangles that can be contained under any two given right lines, and any other line joining their extremities, that will be the greateſt that has the two given lines perpendicular to each other. *Fig.* 1. *Iſoperimetry. Plate* IX. *Geometry.*

Let A B and B D be the given lines, then will the triangle A B D, in which they are perpendicular to each other, be the greateſt: for let B C = B D, and the angle A B C either greater or leſs than the right angle A B D; and let alſo C F be drawn parallel to A B, and meeting B D in F; and join A F, A C, A C′.

Then the < B F C being a right angle, it is evident that B C, or B D, is greater than B F, and therefore the triangle A B D, being greater than the triangle A B F, is alſo greater than its equal A B C. Q. E. D.

The ſame may be otherwiſe demonſtrated, thus:—Aſſume either of the two given ſides for the baſe of the triangle; then the area being directly as the perpendicular let fall upon that ſide from the oppoſite extremity of the other given ſide, the ſurface will be the greateſt when that perpendicular is the greateſt, that is, when the other ſide is not inclined to that perpendicular, but coincides with it; hence the area is a maximum when the two given ſides are perpendicular to each other. Q. E. D.

Prop. II.

Of all triangles of the ſame baſe, and whoſe vertices fall in a right line given in poſition, the one whoſe perimeter is a minimum, is that whoſe ſides make equal angles with the given line. *Fig.* 2.

Let A B be the common baſe of a ſeries of triangles A B C, A B C′, whoſe vertices C, C′, fall in the right line L M, given in poſition; then is the triangle of leaſt perimeter, that whoſe ſides A C, B C, make equal angles with the line L M.

For, let B L be drawn from B perpendicular to L M, and produce it to D, till D M = B M, and join D A; and from the point C, where this line interſects L M, draw C B ; and alſo from any other points C', C'', aſſumed in L M, draw $C' A$, $C' B$, $C' D$; then it is obvious, that $C' D$, $C D$, $C'' D$, are reſpectively equal to $C' B$, $C B$, $C'' B$, and therefore $A C' + C' B = A C' + C' D$, and $A C + C B = A C + C D = A D$; and conſequently, ſince two ſides of a triangle are greater than the third ſide, we have $A C' + C' D > A D$, or $(A C' + C' B) > (A C + C B)$; and the ſame is true of any other point C' in the line L M; therefore $A C + C B$ is leſs than any other two lines that can be drawn from A, B, to meet in the line L M, and conſequently $A B + A C + C B$ is the triangle, having the minimum perimeter, and it has its ſides meeting L M at equal angles, as is evident, Q. E. D.

Cor.—Of all lines drawn from two given points, to meet in a line given in poſition, the ſum of thoſe two ſhall be the leaſt, that make equal angles with the given line.

Prop. III.

Of all triangles having the ſame baſe, and the ſum of the other two ſides the ſame, the iſoſceles is the greateſt. *Fig.* 3.

Let A C B be an iſoſceles triangle on the baſe A B, and A D B a triangle on the ſame baſe, having its two ſides $A D + D B = A C + C B$; then will A B C be the greateſt triangle.

Firſt draw C H perpendicular to A B, and D E F parallel to A B, interſecting C H (produced if neceſſary) in the point E ; likewiſe let A E and B E be drawn.

Now it is evident, that the angles A E F and B E D are equal, and conſequently by Prop. II. $A E + E B$ is leſs than $A D + D B$, or leſs than the equal ſum $A C + C B$; therefore the point E, and conſequently the whole triangle A E B, muſt fall within the triangle A C B, and therefore the triangle A E B, or its equal A D B, is leſs than A C B. Q. E. D.

Prop. IV.

Of all triangles ſtanding on the ſame baſe, and having the ſame vertical angle, the iſoſceles one is the greateſt. *Fig.* 4.

For ſince all triangles whoſe baſes and vertical angles are equal have their vertices in the ſame circular ſegment, it is obvious, that the iſoſceles triangle A B C is that which has the greateſt perpendicular; and ſince triangles whoſe baſes are given, are as their perpendiculars, it follows that the iſoſceles triangle, which has the greateſt perpendicular, will alſo have the greateſt ſurface. Q. E. D.

Prop. V.

Of all right lines that can be drawn through a given point, between two right lines given in poſition, but not parallel, that which is biſected by the given point forms, with the other two lines, the leaſt triangle. *Fig.* 5.

Let A B, B C be any two lines given in poſition, and D the given point ; then I ſay that the line E D F, which is biſected in the point D, makes with the two given lines A B, B C the leaſt triangle. For if E I be drawn parallel to B C, meeting G H in I, the equi-angular triangles D F H, and D E I, will be equal, becauſe $E D = F D$; and D F H will therefore be greater, or leſs, than D E G, according as B G is leſs, or greater, than B E ; in the latter caſe, let the ſpace D E B H be added to both, ſo ſhall F E B be leſs than G H B ; and if in the former caſe, D G B F be added, then will H G B be greater than F E B ; and conſequently F E B, in this caſe alſo, leſs than H G B. Q. E. D.

Cor.—If D M and D N be drawn parallel to B C and B A, the two equal triangles D E M and D F N, taken together (ſince $E M = D N = M B$), will be equal to the parallelogram D M B N ; and therefore this parallelogram is equal to half the triangle F E B, but leſs than half the triangle B G H ; whence it follows, that a parallelogram is always leſs than half the triangle in which it is inſcribed, except when the baſe of the one is half the baſe of the other, in which caſe the parallelogram is exactly equal to half the triangle, which is the maximum parallelogram that can be inſcribed in any triangle.

Scholium.—From the preceding corollary it might be demonſtrated, that the leaſt triangle that can poſſibly be deſcribed about, and the greateſt parallelogram that can be inſcribed within, any curve, concave to its axis, will be when the ſubtangent is equal to half the baſe of the triangle, or to the whole baſe of the parallelogram.

Prop. VI.

Of all right-lined figures, contained under the ſame number of ſides, and inſcribed in the ſame circle, that is the greateſt whoſe ſides are all equal. *Fig.* 6.

For, if poſſible, let ſome polygon, A B C E F, whoſe ſides C E, F E, are unequal, be the greateſt ; and let C D F be an iſoſceles triangle, deſcribed in the ſame ſegment with C E F which, being greater than C E F by Prop. IV. the whole polygon A B C D F is greater than the polygon A B C E F, whereas we have ſuppoſed the latter to be the greateſt, which is abſurd ; therefore the polygon which has all its ſides equal is the greateſt. Q. E. D.

Cor. 1.—It follows, with reference to the ſame figure, that of all right-lined figures, contained under the ſame perimeter, and of the ſame number of ſides, the greateſt is that which has all its ſides equal.

For if A B C E F be ſuppoſed the greateſt, in which the ſides C E and E F are unequal, then the triangle C E F would be greater than the triangle C D F, the ſum of the ſides in both caſes being equal ; but, ſince C D F is an iſoſceles triangle, it is greater than any other on the ſame baſe, and of equal perimeter, Prop. III. ; therefore D C and D F muſt be equal, and the ſame may be demonſtrated of any other two unequal ſides.

Cor. 2.—Hence again it follows, that of all right-lined figures, contained under the ſame number of ſides, and of equal perimeters, the greateſt is that which may be inſcribed in a circle ; the figure being a regular polygon by the foregoing corollary.

Prop. VII.

Of all rectilinear figures, in which all the ſides except one are given, the greateſt is that which may be inſcribed in a ſemicircle, whoſe diameter is that unknown ſide. *Fig.* 7.

For conceive A B C D E F to be a rectilinear figure, that is not inſcribable in a ſemicircle, and draw any two lines A D, F D, from the extremities of the ſide A F, to any angle of the figure ; then it is obvious, that the whole figure will be the greateſt when the triangle A D F is the greateſt, but this will be Prop. I. when A D F is a right angle, and in the ſame manner we find that A C F is a right angle, and ſo on ; and conſequently when the figure is inſcribed in a ſemicircle, of which the unknown ſide is the diameter, its ſurface will be the greateſt. Q. E. D.

Prop. VIII.

Of all figures, made with ſides given in number and magnitude,

nitude, that which may be inſcribed in a circle is the greateſt. *Figs.* 8. and 9.

Let $ABCDE$, &c., and $abcde$, &c. be two polygons, of which the ſides of the one are reſpectively equal to the ſides of the other; that is, $AB = ab$, $BC = bc$, $CD = cd$, &c., the firſt of which is inſcribed in a circle, but the other not inſcribable; then I ſay, that the polygon $ABCDE$, &c. that is inſcribed in a circle, is greater than the polygon $abcde$, &c. which is not ſo.

For draw the diameter EP; join AP, BP; and upon $ab = AB$ make the triangle apb equal in all reſpects to the triangle APB, and join ep. Then of the two figures $cdcbp$, and $pagfe$, one at leaſt is not by (hyp.) inſcribable in a ſemicircle, of which ep is the diameter, conſequently one at leaſt of theſe two figures is ſmaller than the correſponding part of the figure $ABCDE$, &c.; and therefore the whole of this laſt figure $ABCDEFGP$ is greater than the other whole figure $abcdefgp$; and if from each of theſe there be taken away the equal triangles APB, and apb, there will remain the polygon $ABCDE$, &c. greater than the polygon $abcde$, &c. Q. E. D.

Cor.—The magnitude of the greateſt polygon which can be contained under any number of unequal ſides, does not at all depend upon the order in which thoſe lines are connected with each other. For ſince in all caſes it muſt be inſcribable in a circle, it may always be divided into the ſame number of iſoſceles triangles, which will be reſpectively equal in all caſes.

Prop. IX.

Of all polygons circumſcribed about the ſame or equal circles, that has the greateſt ſurface which has the greateſt perimeter. For conceive radii to be drawn from the centre of the circle to each of the points of contact, then it is obvious that the area of the polygon will be equal to the rectangle of the radius into half the perimeter of the figure; therefore the area being as the perimeter, it follows that the polygon, having the greateſt perimeter, will have the greateſt area. Q. E. D.

Cor. 1.—Hence the area of any polygon circumſcribed about a circle, is to the area of the circle, as the perimeter of the former is to the circumference of the latter. Alſo, the area of different polygons circumſcribed about the ſame, or equal circles, are to each other as their perimeters.

Cor. 2.—If a circle and a polygon, circumſcribable about another circle, are iſoperimeters, they will be to each other as the radii of the circles.

Prop. X.

The circle is greater than any rectilinear figure of the ſame perimeter; and it has a perimeter leſs than any rectilinear figure of equal ſurface. *Figs.* 10. and 11.

Let the circle PQ, and the polygon $ABCDEF$, be iſoperimeters; then I ſay that the circle is greater than the polygon.

For firſt, whatever may be the number of ſides of the polygon, it will be the greateſt under the ſame perimeter when the polygon is regular, Cor. 1. Prop. VI.; and conſequently there may be a circle inſcribed within it, the area of which circle will be evidently leſs than the area of the polygon, and therefore by Cor. 1. of the preceding propoſition, the circumference of this circle will be leſs than the perimeter of the polygon, or leſs than that of the circle PQ; and conſequently, alſo, the radius of the former will be leſs than the radius of the latter. But by Cor. 2. Prop. IX. the area of the circle PQ, is to the area of the polygon, as the radius of the circle PQ is to the radius of the circle ab; and therefore the area of the former is greater than the area of the latter; that is, a circle is greater than any right-lined figure of equal perimeter.

Again, converſely, if the areas are equal, the circumference of the circles is leſs than the perimeters of the polygon.

For conceive a circle to be made whoſe circumference is equal to the perimeter of the polygon, then will this circle be greater than the polygon by what is proved above, and conſequently greater than that circle which is equal to the polygon; and therefore its circumference will alſo be greater, that is, the perimeter of the polygon will always be greater than the circumference of a circle of equal ſurface. Q. E. D.

Prop. XI.

The greateſt rectangle, that can be contained under the two parts of a line, any how divided, will be when the line is biſected.

Let AB be a line that is biſected in C, then will $AC \times CB$ be greater than $AD \times DB$, D being any other point in the line AB.

For $AC \times CB = AC^2$, but $AD \times DB = (AC - DC) \times (AC + DC) = AC^2 - DC^2$; conſequently the firſt rectangle is the greateſt. Q. E. D.

Prop. XII.

The greateſt ſolid that can be contained, under the three parts of a given line, any way taken, will be that in which the three parts are equal to each other.

For ſuppoſing the point C fixed, then the rectangle of the two parts $AD \times DC$, will be the greateſt when $AD = DC$ (by Prop. XI). In the ſame way, if any other point be ſuppoſed fixed, as D, then will the rectangle $DC \times CB$ be the greateſt when $DC = CB$, and conſequently the ſolid $AD \times DC \times CB$ will be the greateſt when theſe parts are all equal. Q. E. D.

Cor.—Hence of all parallelopipedons having the ſum of their dimenſions the ſame, the cube is that which has the greateſt capacity.

Prop. XIII.

A line being divided into two parts, the ſolid that is contained under one of thoſe parts, and the ſquare of the other, will be the greateſt when the latter part is double the former.

Let AB be divided into two parts in the point C, making $AC = 2\,CB$, then will $AC^2 \times CB$ be greater than when C is taken in any other part of the line AB.

For in whatever part of the line AB the point C be taken, the point AC may be biſected in D, and then we ſhall have $AC^2 \times CB =$ four times $AD \times DC \times CB$, but this laſt is the greateſt when $AD = DC = CB$ (Prop. XII.) therefore the former is the greateſt when $AC = 2\,CB$. Q. E. D.

Prop. XIV.

Of all priſms of equal altitudes, and whoſe baſes are alſo equal, and like, the right priſm has the ſmalleſt ſurface.

For the area of each face of the priſm is proportional to its height; and therefore the area of each face is the ſmalleſt when its height is the ſmalleſt, that is, when it is equal to the altitude of the priſm, which is evidently when the priſm is a right one. Q. E. D.

Cor.—And hence, converſely, of all priſms whoſe baſes are equal and like, and whoſe lateral ſurface is the ſame, the right priſm has the greateſt altitude and capacity.

Prop. XV.

A cylinder has a leſs ſurface than any priſm of equal baſe and altitude.

For ſince the baſes and altitudes are equal by hypotheſis, the ſurfaces will be greater or leſs, as the lateral ſurfaces are greater or leſs; but theſe will be as the perimeters of the ſolid baſes, of which that of the cylinder will be the leaſt, being a circle (by Prop. X.), and conſequently the cylinder is that which has the leaſt ſurface.

Cor. 1.—And again converſely, of all ſolids on equal baſes, and whoſe ſurfaces are alſo equal, the cylinder is that which has the greateſt capacity.

Cor. 2.—In the ſame manner (by Prop. VI. Cor. 1.) it may be demonſtrated, that of all right priſms of the ſame altitude, and whoſe baſes are equal, and of the ſame number of ſides; that has the leaſt ſurface whoſe baſe is a regular figure, and therefore when the priſm is a parallelopiped the baſe is a ſquare.

Cor. 3.—And again, of all right priſms, whoſe altitudes and ſurfaces are equal, and whoſe baſes have a given number of ſides, that which has a regular figure for its baſe is the greateſt; and therefore when the priſm is a parallelopiped the baſe is a ſquare.

Prop. XVI.

Of all right parallelopipeds, given in magnitude, that which has the ſmalleſt ſurface has all its faces equal, or is a cube: and reciprocally of all parallelopipeds of equal ſurface, the greateſt is a cube.

For by the foregoing corollaries, the right parallelopiped, having the ſmalleſt ſurface, with the ſame capacity, or the greateſt capacity with the ſame ſurface has a ſquare for its baſe: but any face whatever may be taken for the baſe: therefore in the parallelopiped, whoſe ſurface is the ſmalleſt with the ſame capacity, or whoſe capacity is the greateſt with the ſame ſurface, has neceſſarily every two of its oppoſite faces ſquares, and conſequently it is a cube. Q. E. D.

Prop. XVII.

Of all cylinders of the ſame capacity, that has the leaſt ſurface whoſe altitude is equal to the diameter of its baſe. *Figs.* 12. and 13.

Let A B C D, and *a b c d*, be two cylinders of equal capacity, and of which the firſt, A B C D, has its altitude equal to the diameter of its baſe, and the other any cylinder whoſe dimenſions are not the ſame with the firſt, then I ſay the cylinder A B C D has the leaſt ſurface.

For conceive each of theſe cylinders to be circumſcribed by a ſquare priſm, then will the capacities of theſe priſms be alſo equal; and their ſurfaces will be to each other as the ſurfaces of the cylinders that they circumſcribe, as is evident from (Cor. 1. Prop. IX.); and therefore reciprocally, the ſurfaces of the cylinders will be to each other as the ſurfaces of the priſms: but ſince theſe priſms have equal capacities, that which circumſcribes the cylinder A B C D has the leaſt ſurface, becauſe it is a cube (Prop. XVI.); and conſequently, the ſurface of that cylinder is the leaſt alſo. Q. E. D.

Cor.—In a ſimilar manner it is demonſtrated, that of all cylinders of the ſame ſurface, that has the greateſt ſolidity whoſe altitude is equal to the diameter of its baſe.

Iſoperimetrical Problems.—We have before obſerved, that the theorems relating to the ſurfaces and ſolidities of bodies, of equal perimeters, might be conſidered as forming the elements of iſoperimetry, and which, as we have ſeen, are demonſtrable from the ſimple elements of geometry; while thoſe relating to the *maxima et minima* of curves are of the higheſt order of problems; which have called into action the talents, and excited the paſſions, of ſome of the ableſt geometers of modern times, having led to a diſpute, which, for want of impartial and competent judges, remained undecided for many years, and which has ſince been termed "the war of problems," on account of the great intereſt it excited, and the determined and able manner in which each party ſupported its opinion, and conteſted that of its opponent; and as this diſpute cannot but be conſidered as one of the moſt memorable events in the hiſtory of the modern analyſis, we ſhall preſent the reader with an abſtract of it, ſo far as it relates to iſoperimetry, referring him for further information to the "Hiſtoire des Mathematiques," by Montucla, vol. iii. p. 322, and to Boſſut's "Hiſtory of Mathematics," p. 331; and alſo to an intereſting little treatiſe on this ſubject, lately publiſhed by Mr. Woodhouſe of Caius college, Cambridge.

The firſt problem which can be ſaid to relate to this claſs, was propoſed by Newton in his "Principia," which was that of the ſolid of leaſt reſiſtance. But the ſubject and doctrine did not become a matter of diſcuſſion and controverſy, till John Bernouilli required of mathematicians the determination of the curve of quickeſt deſcent, in a paper publiſhed in the Leipſic acts for June 1696, under the following form:

Problema Novum

ad cujus ſolutionem mathematici invitantur.

"Datis in plano verticali duobus punctis A et B, aſſignare mobili M, viam A M B, per quam gravitate ſua deſcendens, et moveri incipiens a puncto A, breviſſimo tempore perveniat ad altrum punctum B." *Fig.* 14.

At the firſt view of this problem, it would be imagined, that a right line, as it is the ſhorteſt path from one point to another, muſt likewiſe be the line of ſwifteſt deſcent: but the attentive geometer will not haſtily aſſert this, when he conſiders that in a concave curve deſcribed from one point to another, the moving body deſcends at firſt in a direction more approaching to a perpendicular, and conſequently acquires a greater velocity than down an inclined plane; which greater velocity is to be ſet againſt the length of the path, which may cauſe the body to arrive at the point B ſooner through the curve than down the plane. Metaphyſics alone, therefore, cannot ſolve the queſtion; in fact it requires the utmoſt accuracy of mathematical inveſtigation and calculation, the reſult of which ſhews that the path required is a cycloid reverſed, as we ſhall ſee in what follows, being at that time a new and remarkable property of this curve, which the reſearches of Huygens and Paſcal had previouſly rendered ſo celebrated. See Cycloid.

According to Boſſut, Leibnitz reſolved this problem the ſame day on which he received it, but that he and John Bernouilli agreed to keep back their ſolutions; but the fact of Leibnitz having obtained a correct ſolution ſeems to be very doubtful; at all events, at the expiration of ſix months, the time allowed, no ſolution was publiſhed, and the time was accordingly enlarged to one year, during which period the ſolutions of James Bernouilli, Newton, and the marquis de l'Hôpital appeared; Bernouilli's and Newton's were both given in the Acta. Erud. Lipſ. for May 1697, but the latter without a name, the real author of which, however, mathematicians had little trouble in divining, for as John Bernouilli obſerved on this occaſion, "ex ungue leonem."

James Bernouilli, in the courſe of his inveſtigations, had aſcended to problems on iſoperimetrical figures requiring ſtill more profound ſpeculations, and, after having reſolved them, he propoſed to mathematicians in general, at the concluſion of his ſolution of his brother's problem.

The rivalry in glory that had long divided the Bernouillis, was fully diſplayed on this occaſion. At firſt it was a little moderated by their habits of ſeeing each other, at leaſt occaſionally, and by the intervention of their common friends; but John having been appointed profeſſor of mathematics at Groningen in 1695, all private intercourſe between them ſoon ceaſed, and they no longer correſponded except through the medium of periodical publications, for the purpoſe of propoſing to each other the moſt difficult problems; and here it was that James Bernouilli, deſirous of avenging himſelf of the ingratitude of his brother, to whom he had been preceptor, challenged him by name to anſwer the following problem.

Of all iſoperimetrical curves deſcribed on the ſame common baſe B N, to find B F N, ſuch that another curve, B Z N, ſhall contain the greateſt ſpace; the ordinate of which, P Z, is in any multiplicate or ſubmultiplicate ratio of the ordinate P F, or of the arc B F. Or, as we ſhould ſay now, the ordinate of which, P Z, is any function of P F, or of the arc B F. *Fig.* 15.

To this leading propoſition, he added another more analogous to that of the line of ſwifteſt deſcent, which was, to find among all the cycloids, which a heavy body may deſcribe from a point to a line given in poſition, that cycloid which is deſcribed in the leaſt poſſible time, which propoſitions he concluded in nearly the following words. "A perſon for whom I pledge myſelf (*Prodit* NON NEMO, pro qui caveo) engages to give my brother, independently of the praiſe he will deſerve, a prize of 50 florins, on condition that within three months, he engages to reſolve theſe problems, and within a year publiſhes legitimate ſolutions of them." Adding, "if at the expiration of this time, no one ſhall have reſolved them, I will make public my ſolutions."

Theſe propoſitions, as we have before obſerved, were ſent with the ſolution of the *brachyſtochrone* (a term by which John Bernouilli's problem was deſignated); and as ſoon as he had noticed the ſolutions to this, in doing which he beſtowed great praiſe on that of Newton and de l'Hôpital, and ſome ſlight cenſure on his brother's, he undertook the ſolution of James's problems above-mentioned, and imagining that his theory of the line of ſwifteſt deſcent was alone ſufficient to ſolve them, the following expreſſions of ingenuous vanity eſcaped him. "Difficult," ſays he, "as theſe problems appear, I did not fail to apply to them the inſtant they came to my hands, and hear with what ſucceſs: inſtead of three months allowed me to found their depth, and the remainder of the year to find their ſolutions, I have employed only three minutes to examine, enter upon, and dive to the bottom of this myſtery." Theſe high ſounding phraſes were accompanied with the conſtruction he gave of the problems, and the conſequent demand of the prize, which he ſaid he ſhould give to the poor, as it coſt him ſo little trouble to gain it. But the buſineſs was by no means ſo far advanced as he ſuppoſed, as his ſolution only anſwered for particular caſes, in conſequence of his having made only two elements of the curve enter therein, while the general ſolution required three; and he therefore thus laid himſelf open to the keen reproaches of his brother, who ſoon perceived in what reſpect the ſolution was defective, and being at the ſame time perfectly ſure of his own, he publiſhed an advertiſement in 1698, in which he aſſerted that his brother's method was defective. He ſtill allowed geometricians time to find the ſolution, and if no one gave it, he pledged himſelf for three things; 1ſt. To divine with preciſion the analyſis of his brother: 2dly. Whatever it might be, to point out fallacies in it: and, 3dly. To give the true ſolution of the problem in all its parts. Adding, at the ſame time, that if any perſon was ſufficiently intereſted in the progreſs of ſcience to venture a wager upon theſe articles, that he would engage to forfeit an equal ſum if he failed in the firſt; double the ſum if he did not ſucceed in the ſecond; and triple the ſum if he did not accompliſh the third.

The ſingularity of this advertiſement, and the reputation of the writer as a geometrician, a little ſtaggered John Bernouilli's confidence in his method. He reviſed his ſolution, allowed that he had made a trifling miſtake, which he aſcribed to too great precipitancy, and ſent a new reſult, but without aſſuming a more modeſt tone, and again demanded the prize.

To theſe pretenſions, James Bernouilli laconically anſwered, "I beg my brother to reviſe his laſt ſolution anew, to examine it carefully in every point, and then to let us know whether it be all right; as he muſt be aware, that no attention can be paid to his excuſes of precipitancy after I have publiſhed my ſolution." But John Bernouilli, who was not aware of the radical defect of the method that he employed, felt an entire confidence in his laſt reſult, and ſaid in reply there was no neceſſity to reviſe what he had done, and that his time would be much better ſpent in making new diſcoveries. To this confident aſſertion James ironically anſwered, "I never believed that my brother was maſter of the true ſolution of the iſoperimetrical problem, and I doubt it now more than ever, from the difficulty he makes of the reviſion of his ſolution; if it coſt him but three minutes, as he aſſerts, "to examine, enter upon, and dive to the bottom of the whole myſtery," ſurely the reviſal could not require more: but ſuppoſe he ſpent double that time, how many new diſcoveries would he be robbed of by the ſix minutes thus employed."

To this John again replied, and the matter ſtill remained undecided; till, in 1700, James Bernouilli printed at Baſil a letter addreſſed to his brother, in which he invited him with great moderation to publiſh his method, and concluded by giving the formulæ of the problem, but without their demonſtrations. John ſoon perceived how far he differed from his brother, but not diſcovering the principle of the true ſolution, nor the defect of his own method, he at length gave it in a paper which was ſent under a ſeal to the Academy of Sciences at Paris, in the month of February 1701, on condition that it ſhould not be opened without his conſent, and after his brother had publiſhed his analyſis.

As ſoon as James Bernouilli was informed of this, he had no longer any reaſon to keep his ſolution a ſecret: he accordingly made it public, and maintained it by way of a theſis at Baſil, in March 1701, with a dedication to the four illuſtrious mathematicians, de l'Hôpital, Leibnitz, Newton, and Fatio de Duillier. He likewiſe printed it ſeparately under the following title: "Analyſis magni problematici iſoperimetrici." This was conſidered as a prodigy of ſagacity and invention; and indeed, if the time be conſidered, it will not be too much to aſſert that a more difficult problem was never reſolved. The marquis de l'Hôpital wrote to Leibnitz, that he had read it with avidity, and that he had found it very direct and accurate, which teſtimony Leibnitz tranſmitted to John Bernouilli himſelf, though he was much prejudiced in his favour, having himſelf before examined and approved of John Bernouilli's ſolution; the latter having ſubmitted it to him for his opinion.

After this publication John Bernouilli maintained a perfect ſilence, neither publiſhing his own ſolution, nor criticiſing that of his brother's. At length, in 1705, James Bernouilli died, and a ſhort time after John Bernouilli publiſhed his ſolution in the Memoires of the academy for 1706. This, however, poſſeſſed the ſame radical defect that has been before ſtated, namely, that the author had conſidered only two elements of the curve, inſtead of which it is requiſite to have three enter, or to employ an equivalent condition. In problems of the ſame kind as that of the line of ſwifteſt deſcent, where it is ſimply required to fulfil the conditions of the maximum or minimum, the applying of this condition to two elements is ſufficient to find the fluxional equation of the curve ; but when, beſide the maximum or minimum, the curve muſt poſſeſs a farther property of being iſoperimetrical to another, this new condition requires that a third element of the curve ſhall have a certain inclination with reſpect to the other two ; and every determination, founded ſimply on the firſt conſideration, will give falſe reſults ; except in thoſe caſes where a curve cannot ſatisfy one of the two conditions, without at the ſame time fulfilling the other ; and of this John Bernouilli was at length ſo convinced, that he made it the baſis of a new ſolution, more than 13 years after his brother's death, confeſſing himſelf deceived in his firſt. "J'ai donner ici," ſays he, "pour reparer cette inadvertence une nouvelle manière de reſoudre," &c. This was a tardy avowal, but it would ſtill have done him honour, had he at the ſame time acknowledged that his new ſolution was in ſubſtance the ſame as his brother's ; but given in a form which conſiderably abridged the calculation ; inſtead of which, he even in this ſeeks every occaſion to aſperſe his brother's method, and this after a lapſe of ſo many years, when, as Mr. Woodhouſe obſerves, "the recollection of his brother's kindneſs, or zeal for a brother's fame, ought to have aſſuaged and laid to ſleep all angry paſſions ;" but with regard to the ſolution itſelf, it muſt be acknowledged, conſidering the ſtate of analytical ſcience at that time, to poſſeſs very diſtinguiſhing marks of a great maſter, and fairly merits the eulogium which the author himſelf has beſtowed upon it ; that of being equally exempt from the tedіouſneſs of his brother's, and the obſcurity of Taylor's calculation, alluding here to the ſolution of the celebrated Dr. Brook Taylor, which appeared, in 1715, in his "Methodus Incrementorum." At the period at which we have now arrived, James Bernouilli had been dead ſeveral years, and the above paper was the laſt that John Bernouilli wrote on the ſubject of iſoperimetry, but the theory was purſued by many other eminent mathematicians, and introduced into ſeveral of their works. Simpſon, in his Tracts, has a chapter, entitled "An Inveſtigation of a General Rule for the Reſolution of Iſoperimetrical Problems of all Orders." He has alſo given the ſolution of ſeveral iſoperimetrical problems, in his "Doctrine of Fluxions." Maclaurin has likewiſe a chapter on the ſame ſubject in his "Treatiſe of Fluxions." To theſe may alſo be added Emerſon, Le Seur, Boſſut, and Lacroix ; each of which authors has introduced this doctrine into their reſpective works ; but the two writers who have moſt contributed in bringing to perfection the theory of iſoperimetry, are Euler and Lagrange, the former having, beſide ſeveral memoirs in the Acta Petro, a tract on this ſubject, entitled "Methodus inveniendi Lineas Curvas Proprietate Maximi Minimive gaudentes," which, with a very few exceptions, is what it was intended to be, a complete treatiſe, containing eſſentially all the requiſite methods of ſolutions, with great variety and abundance of examples and illuſtrations : there were ſtill, however, ſome defects in this work, for want of a better algorithm, or more compendious proceſs of eſtabliſhing the theorems ; and certain ſupplemental formulæ ; which defects have been finally removed by Lagrange, in his admirable and refined "Calculus of Variations ;" and a very intereſting treatiſe on the ſame ſubject has lately been publiſhed by Mr. Woodhouſe, in which are combined the hiſtory and progreſs of the ſcience, with ſuch obſervations and remarks, as ſeem moſt calculated to render it inſtructive and familiar to the Engliſh ſtudent.

Having thus given a brief ſketch of the ſucceſſive improvements that have been made in the theory of iſoperimetry, from the time of its firſt introduction by John Bernouilli, to its completion by Lagrange ; we ſhall conclude this article with the ſolution of a few problems which will illuſtrate many of the remarks that have been made in the foregoing pages, referring the reader who wiſhes for farther information to the works above quoted.

The reſearches of Euler and Lagrange have rendered the ſolution of iſoperimetrical problems extremely ſimple, but the inveſtigations by which they arrived at their formulæ of ſolution are very profound, long, and embarraſſing, which nothing leſs than the genius of theſe celebrated men would have been able to have reduced to that ſimple form at which they at length arrived, an inveſtigation of which, at leaſt of Lagrange's, will be given under the article VARIATION. In this place we ſhall barely ſtate the reſults, and ſhew their application to the ſolution of a few problems of this kind.

Let V repreſent any function of the variable quantities x and y, and let there be aſſumed

$$\dot{V} = M\dot{x} + N\dot{y} + P\dot{p} + Q\dot{q}, \text{ \&c.} \quad [A]$$

where $p = \frac{\dot{y}}{\dot{x}}$, $q = \frac{\dot{p}}{\dot{x}}$, $r = \frac{\dot{q}}{\dot{x}}$, &c.

Then the ſolution of all iſoperimetrical problems, into which no integral quantity enters, are ſolvible by the following general formula,

$$N - \frac{\dot{P}}{x} + \frac{\ddot{Q}}{\dot{x}^2} - \frac{\dddot{R}}{\dot{x}^3} + \text{\&c.} = 0 \quad [B]$$

which however, for the ſake of a more ready application, may be divided into the following caſes.

Caſe 1.—If M, Q, and all the co-efficients except N and P, in the above value of $\dot{V}$, be equal to zero, then we have $\dot{V} = N\dot{y} + P\dot{p}$; and ſince generally $N - \frac{\dot{P}}{\dot{x}} + \frac{\ddot{Q}}{\dot{x}^2} -$ &c. $= 0$, it becomes in this caſe $N - \frac{\dot{P}}{\dot{x}} = 0$; conſequently, $N\dot{y} - \frac{\dot{y}}{\dot{x}}\dot{P} = 0$; or, ſince $\frac{\dot{y}}{\dot{x}} = p$, it reduces to $N\dot{y} - p\dot{P} = 0$; whence $N\dot{y} = p\dot{P}$; and ſubſtituting this laſt value of $N\dot{y}$, we have $\dot{V} = p\dot{P} + \dot{P}p$; and taking the fluents $V = Pp + c$, c being the correction.

If M be not equal to 0, we muſt add the fluent of $M\dot{x}$; then $V = \int M\dot{x} + Pp + c$.

Caſe 2.—Let $M = 0$, $N = 0$, and all the co-efficients after Q, then $\dot{V} = P\dot{p} + Q\dot{q}$, and the general formula in this caſe becomes

$$-\frac{\dot{P}}{x} + \frac{\ddot{Q}}{\dot{x}^2} = 0;$$

whence $\dot{P} = \frac{\ddot{Q}}{\dot{x}}$, and the fluents give $P = \frac{\dot{Q}}{\dot{x}} + c$;

multiply this by $\dot{p}$, and ſince $\frac{\dot{p}}{\dot{x}} = q$, we thus obtain

$$\mathrm{P}\,\dot{p} = q\,\dot{\mathrm{Q}} + c\,\dot{p};$$

and now ſubſtituting this value of $\mathrm{P}\,\dot{p}$, in the general expreſſion for $\dot{\mathrm{V}}$, it becomes

$$\dot{\mathrm{V}} = q\,\dot{\mathrm{Q}} + \mathrm{Q}\,\dot{q} + c\,\dot{p}$$

and by taking the fluents on both ſides

$$\mathrm{V} = \mathrm{Q}\,q + c\,p + c';$$

c and c' being the corrections.

If M be not equal to o, we muſt add the fluent of $\mathrm{M}\,\dot{x}$; in which caſe

$$\mathrm{V} = \int \mathrm{M}\,\dot{x} + \mathrm{Q}\,q + c\,p + c'$$

Caſe 3.—If $\mathrm{M} = 0$, but N is not $= 0$; that is if the form be

$$\dot{\mathrm{V}} = \mathrm{N}\,\dot{y} + \dot{\mathrm{P}}\,p + \dot{\mathrm{Q}}\,q;$$

then ſince $\mathrm{N} - \frac{\dot{\mathrm{P}}}{\dot{x}} + \frac{\ddot{\mathrm{Q}}}{\dot{x}^2} = 0$,

we have by multiplying by $\dot{y} = p\,\dot{x}$, $\left(\text{becauſe } p = \frac{\dot{y}}{\dot{x}}\right)$

$$\mathrm{N}\,\dot{y} - p\,\dot{\mathrm{P}} + p\,\frac{\ddot{\mathrm{Q}}}{\dot{x}^2}\,\dot{x} = 0.$$

But $p\,\frac{\ddot{\mathrm{Q}}}{\dot{x}^2}\,\dot{x} = \left(p\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\right)^{\cdot} - \dot{p}\,\frac{\dot{\mathrm{Q}}}{\dot{x}} = \left(p\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\right)^{\cdot} -$ $q\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\,\dot{x}$, which laſt expreſſion being ſubſtituted for $p\,\frac{\ddot{\mathrm{Q}}}{\dot{x}^2}\,\dot{x}$, gives $\mathrm{N}\,y = p\,\dot{\mathrm{P}} - \left(p\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\right)^{\cdot} + q\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\,\dot{x}$, whence

$$\dot{\mathrm{V}} = p\,\dot{\mathrm{P}} + \mathrm{P}\,\dot{p} - \left(p\,\frac{\dot{\mathrm{Q}}}{\dot{x}}\right)^{\cdot} + q\,\dot{\mathrm{Q}} + \mathrm{Q}\,\dot{q};$$

and taking the fluents

$$\mathrm{V} = \mathrm{P}\,p + \mathrm{Q}\,q + p\,\frac{\dot{\mathrm{Q}}}{\dot{x}} + c,$$

c being the correction, as before.

We might continue thus to deduce from the general formula other particular ones, but the foregoing are ſufficient for the ſolution of ſuch problems as the limit of our article will admit of in this place, which, for the ſake of a more ready reference, we will again repeat.

1. If the general form $\dot{\mathrm{V}} = \mathrm{M}\,\dot{x} + \mathrm{N}\,\dot{y} + \mathrm{P}\,\dot{p} + \mathrm{Q}\,\dot{q}$ &c.

becomes $\quad \dot{\mathrm{V}} = \mathrm{N}\,\dot{y} + \mathrm{P}\,\dot{p}$

then we have $\quad \mathrm{V} = \mathrm{P}\,p + c \quad [a]$

or $\quad \mathrm{V} = \int \mathrm{M}\,\dot{x} + \mathrm{P}\,p + c \quad [b]$

when M is not equal to o.

2. If the formula be $\dot{\mathrm{V}} = \mathrm{P}\,\dot{p} + \mathrm{Q}\,\dot{q}$

hen will $\quad \mathrm{V} = \mathrm{Q}\,q + c\,\mathrm{P} + c' \quad [c]$

or $\quad \mathrm{V} = \int \mathrm{M}\,\dot{x} + \mathrm{Q}\,q + c\,\mathrm{P} + c' \quad [d]$

when M is not equal to o.

3. If the formula be $\dot{\mathrm{V}} = \mathrm{N}\,\dot{y} + \mathrm{P}\,\dot{p} + \mathrm{Q}\,\dot{q}$

hen will $\quad \mathrm{V} = \mathrm{P}\,p + \mathrm{Q}\,q - p\,\frac{\dot{\mathrm{Q}}}{\dot{x}} + c \quad [e]$

To which we may alſo add the following,

4. If the formula be $\dot{\mathrm{V}} = \mathrm{P}\,\dot{p} + \mathrm{R}\,\dot{r}$,

then will $\quad \mathrm{V} = c\,p + \mathrm{R}\,r - q\,\frac{\dot{\mathrm{R}}}{\dot{x}} + c' \quad [f]$

By means of which formulæ the following problems are readily ſolved.

Problem I.

Required the relation of x and y, ſuch that the fluent of $(a\,x - y^2)\,y\,\dot{x}$, or $\int (a\,x - y^2)\,y\,\dot{x}$, ſhall be a maximum, or a minimum.

Comparing this expreſſion with $\int \mathrm{V}\,\dot{x}$, (the analytical expreſſion for the maximum or minimum property,) we ſee that $\mathrm{V} = a\,x\,y - y^3$, conſequently $\dot{\mathrm{V}} = a\,y\,\dot{x} + (a\,x - 3\,y^2)\,\dot{y}$; which compared with the general formula,

$$\dot{\mathrm{V}} = \mathrm{M}\,\dot{x} + \mathrm{N}\,\dot{y} + \text{\&c.}$$

gives $\mathrm{M} = a\,y$, and $\mathrm{N} = a\,x - 3\,y^2$, $\mathrm{P} = 0$, $\mathrm{Q} = 0$, &c.

But ſince $\mathrm{N} - \frac{\dot{\mathrm{P}}}{\dot{x}} + \text{\&c.} = 0$, this becomes

$$a\,x - 3\,y^2 = 0, \text{ or } y = \sqrt{\frac{a\,x}{3}};$$

which is the relation of x and y required.

Prob. II.

Required the ſhorteſt curve that can be drawn between two points, or between two curves.

Here, if we take z to repreſent the curve, x the abſciſs, and y the ordinate, it will be neceſſary to fulfil the following condition, namely, that $\int \dot{z}$ be a minimum.

Now by the doctrine of fluxions, $\dot{z} = \sqrt{\dot{x}^2 + \dot{y}^2} = \dot{x}\sqrt{1 + \frac{\dot{y}^2}{\dot{x}^2}} = \dot{x}\,\sqrt{1 + p^2}$; which being compared with $\int \mathrm{V}\,\dot{x}$, gives $\mathrm{V} = \sqrt{1 + p^2}$, whence by taking the fluxions on both ſides, it becomes $\dot{\mathrm{V}} = \frac{p\,\dot{p}}{\sqrt{(1 + p^2)}}$; and M, N, &c. all equal to o. Therefore comparing this with the general value of V, we have $\mathrm{P} = \frac{p}{\sqrt{(1 + p^2)}}$, and conſequently from the formula [B] we have, — flux. $\left(\frac{p}{\sqrt{(1 + p^2)}}\right) = 0$; therefore $p = a\,\sqrt{(1 + p^2)}$; and by ſquaring $p^2 = a^2 + a^2\,p^2$, or $(a^2 - 1)\,p^2 = -\,a^2$, whence

$$p = \frac{\dot{y}}{\dot{x}} = \frac{a}{\sqrt{(1 - a^2)}}; \text{ or } \dot{y}\,\sqrt{(1 - a^2)} = a\,\dot{x},$$

taking the fluents $y\,\sqrt{(1 - a^2)} = a\,x + c$, which is an equation to a right line, as it ought to be.

Prob. III.

Required the curve of quickeſt deſcent between two given points. *Fig.* 16. *Plate Iſoperimetry.*

Let A and B be the two given points, and A M B the required curve; draw P M perpendicular to A C; and put $\mathrm{A\,P} = x$, $\mathrm{P\,M} = y$, $\mathrm{A\,M} = z$: then ſince the time will be reciprocally as the ſquare root of the height, it will be required to find $\int \frac{\dot{z}}{\sqrt{y}}$, a minimum, but $\dot{z} = \sqrt{(\dot{x}^2 + \dot{y}^2)}$, whence $\int \frac{\sqrt{(\dot{x}^2 + \dot{y}^2)}}{\sqrt{y}} = \int \frac{\sqrt{\left(1 + \frac{\dot{y}^2}{\dot{x}^2}\right)}}{\sqrt{y}}\,\dot{x} =$

$\int \frac{\sqrt{(1+p^2)}}{\sqrt{y}}\,\dot{x}$, a minimum, which compared with the minimum expreſſion $\int V\,\dot{x}$, gives $V = \frac{\sqrt{(1+p^2)}}{\sqrt{y}}$; whence $\dot{V} = -\frac{\sqrt{(1+p^2)}}{2y^{\frac{3}{2}}}\,\dot{y} + \frac{p\,\dot{p}}{\sqrt{y}\,\sqrt{(1+p^2)}}$, which compared with formula [A], gives $M = 0$; $N = -\frac{\sqrt{(1+p^2)}}{2y^{\frac{3}{2}}}$; $P = \frac{p}{\sqrt{y}\cdot\sqrt{(1+p^2)}}$; $Q = 0$, &c.

Therefore, ſince by formula [a] $V = P\,p + c$; therefore in this caſe $\frac{\sqrt{(1+p^2)}}{\sqrt{y}} = \frac{p^2}{\sqrt{y}\cdot\sqrt{(1+p^2)}} + c$, whence $\frac{1}{\sqrt{y}\cdot\sqrt{(1+p^2)}} = c$; or multiplying both numerator and denominator of this fraction by $\dot{x}$, it becomes $\frac{\dot{x}}{\sqrt{y}\cdot\sqrt{(\dot{x}^2+\dot{y}^2)}} = c$, which is reducible to $\dot{x} = \frac{c\,\sqrt{y}}{\sqrt{(1-c^2y)}}\cdot\dot{y}$, an equation to a cycloid; which, therefore, is the curve required.

PROB. IV.

Required the curve which, by its revolution round its axis, generates the ſolid of leaſt reſiſtance. *Fig.* 17.

Let A B C be the required curve, which by its rotation generates the ſolid, D A C, of leaſt reſiſtance: draw P M perpendicular to A B; put A P = x, P M = y, and the arc A M = z: then we know from the principles of mechanics, that the reſiſtance $= \int \frac{y\,\dot{y}^3}{\dot{x}^2+\dot{y}^2}$, which muſt therefore be a minimum. Now this being put under the form,

$$\int \frac{y\,\frac{\dot{y}^3}{\dot{x}^3}}{1+\frac{\dot{y}^2}{\dot{x}^2}}\,\dot{x} = \int \frac{y\,p^3}{1+p^2}\,\dot{x},\ \left(\text{becauſe } p = \frac{\dot{y}}{\dot{x}}\right)$$

which being compared with the expreſſion $\int V\,\dot{x}$, gives

$$V = \frac{y\,p^3}{1+p^2};$$

the fluxion of which expreſſion being taken, gives

$$\dot{V} = \frac{p^3\,\dot{y}}{1+p^2} + \frac{(3\,y\,p^2+y\,p^4)\,\dot{p}}{(1+p^2)^2}:$$

whence $M = 0$; $N = \frac{p^3}{1+p^2}$; $P = \frac{3\,y\,p^2+y\,p^4}{(1+p^2)^2}$.

Hence by the foregoing form [a], and uſing $-c$ for a correction, we have

$$\frac{y\,p^3}{1+p^2} = \frac{3\,y\,p^2+y\,p^4}{(1+p^2)^2} - c,$$

which by reduction gives,

$c\,(1+p^2)^2 = 2\,y\,p^3$, and $y = \frac{c}{2\,p^3} + \frac{c}{p} + \frac{c\,p}{2}$;

but ſince $p = \frac{\dot{y}}{\dot{x}}$, or $p\,\dot{x} = \dot{y}$, we obtain

$$\dot{x} = -\frac{3\,c}{2\,p^5}\,\dot{p} - \frac{c}{p^3}\,\dot{p} + \frac{c}{2\,p}\,\dot{p};$$

whence, $x = \frac{3\,c}{8\,p^4} + \frac{c}{2\,p^2} + \frac{c}{2}$ hyp. log. $p + c'$;

by means of which equation, and that above, *viz.* $c\,(1+p^2)^2 = 2\,y\,p^3$, the relative values of x and y are determined.

PROB. V.

Required the brachyſtochrone, or curve of quickeſt deſcent, when the length of the curve is given.

This is an iſoperimetrical problem of the ſecond order: thoſe which we have been conſidering have only one condition enters, namely the minimum; but in the preſent problem, beſide the minimum property, the iſoperimetrical alſo enters; and we have, therefore, to find the variation of $(V - a\,u)$, inſtead of V. See Woodhouſe's Tract on Iſoperimetry, p. 122.

Here by means of the compariſon of $\int (V - a\,u)\,\dot{x}$, with the minimum condition of the problem, we obtain

$$V = \frac{\sqrt{(1+p^2)}}{\sqrt{y}},\ \text{and } u = \sqrt{(1+p^2)};$$

therefore $V - a\,u$, or $V' = \frac{\sqrt{(1+p^2)}}{\sqrt{y}} - a\,\sqrt{(1+p^2)}$,

and conſequently,

$$\dot{V}' = -\frac{1}{2\,y^{\frac{3}{2}}}\,\sqrt{(1+p^2)}\,\dot{y} + \left(\frac{1}{\sqrt{y}} - a\right) \times \frac{p\,\dot{p}}{\sqrt{(1+p^2)}}.$$

Hence we deduce, by comparing this with the general formula [A],

$$\begin{cases} N = -\frac{1}{2\,y^{\frac{3}{2}}}\,\sqrt{(1+p^2)} \\ P = \left(\frac{1}{\sqrt{y}} - a\right) \times \frac{p}{\sqrt{(1+p^2)}}. \end{cases}$$

Hence again by formula [a],

$$\sqrt{(1+p^2)}\left(\frac{1}{\sqrt{y}} - a\right) = \frac{p^2}{\sqrt{(1+p^2)}}\left(\frac{1}{\sqrt{y}} - a\right) + c,$$

or, $\left(\frac{1}{\sqrt{y}} - a\right) = c\,\sqrt{(1+p^2)}$:

whence again by reduction,

$$\dot{x} = \frac{c\,\sqrt{y}\,\dot{y}}{\sqrt{[1 - 2\,a\,\sqrt{y} + (a^2 - c^2)\,y]}}:$$

where, by taking the fluents, we have the relation between x and y, the abſciſs and ordinate of the curve.

If, inſtead of the length of the curve, the area had been given, then $\int u\,\dot{x} = \int y\,\dot{x}$, and conſequently we ſhould have,

$$V' = V - a\,u = \frac{\sqrt{(1+p^2)}}{\sqrt{y}} - a\,y;$$

in which caſe,

$$P = \frac{p}{\sqrt{y}\,\sqrt{(1+p^2)}},$$

and $\frac{\sqrt{(1+p^2)}}{\sqrt{y}} - a\,y = \frac{p^2}{\sqrt{y}\,\sqrt{(1+p^2)}} + c$:

whence again,

$$\frac{1}{\sqrt{y}\,\sqrt{(1+p^2)}} = c + a\,y;$$

which by reduction becomes,

$\dot{x} =$

$$\dot{x} = \frac{(c+ay)\sqrt{y}\cdot\dot{y}}{\sqrt{[1-y(c+ay)^2]}};$$

which expreſſion, when $c = 0$, becomes

$$\dot{x} = \frac{ay.\dot{y}}{\sqrt{(1-a^2y^2)}}:$$

whence the relative values of x and y are determined in both caſes.

Prob. VI.

Required the ſolid of leaſt reſiſtance, amongſt all the ſolids of equal capacity.

Here, the ſame as in Prob. IV., we have $V = \frac{yp^3}{1+p^2}$, and $\int u\dot{x} = \int \pi y^2 \dot{x}$, ($\pi$ being equal 3.14159, &c.) (ſee Woodhouſe's Iſoperimetry, p. 123.); therefore $V - au = V' = \frac{yp^3}{1+p^2} - ay^2$ (including π in the quantity a).

Hence $P = \frac{3yp^2+yp^4}{(1+p^2)^2}$, and by formula [$a$]

$$\frac{yp^3}{1+p^2} - ay^2 = \frac{3yp^3+yp^5}{(1+p^2)^2} - c,$$

whence, by reduction, we obtain

$$\left\{\begin{matrix}(c-ay^2)\ (1+p^2)^2 = 2yp^3, \text{ or} \\ (c-ay^2)\,d z^4 = 2y\dot{y}^3\dot{x}\end{matrix}\right\}$$

which expreſſions will furniſh the relative values of x and y.

If, inſtead of the condition of equal capacity, that of equal ſuperficies be ſubſtituted, we have

$$V - au = V' = \frac{yp^3}{1+p^2} - ay\sqrt{(1+p^2)}, \text{ and}$$

$$P = \frac{3yp^2+yp^4}{(1+p^2)^2} - \frac{ayp}{\sqrt{(1+p^2)}};$$

whence we deduce from formula [a]

$$\frac{yp^3}{1+p^2} - ay\sqrt{(1+p^2)} =$$

$$\frac{3yp^3+yp^5}{(1+p^2)^2} - \frac{ayp^2}{\sqrt{(1+p^2)}} - c,$$

which, by reduction, becomes

$$c\,(1+p^2)^2 = 2yp^3 + ay\,(1+p^2)^{\frac{3}{2}};$$

$$\text{or,}\quad c\dot{z}^4 = 2y\dot{y}^3\dot{x} + ay\dot{z}^3\dot{x}.$$

Prob. VII.

Given the length of a curve, to determine its nature, when the ſolid generated by its rotation is a maximum.

Making, as before, $\pi = 3.14159$, &c. we ſhall have

$$\int V\dot{x} = \int \pi y^2\dot{x}, \text{ and } \int u\dot{x} = \int \sqrt{(1+p^2)}\,\dot{x}.$$

Therefore V' or $V - au = \pi y^2 - a\sqrt{(1+p^2)}$;

and taking the fluxion on both ſides,

$$V' = 2\pi y\dot{y} - \frac{ap\dot{p}}{\sqrt{(1+p^2)}}:$$

comparing this expreſſion with the general one [A],

we have $P = -\frac{ap}{\sqrt{(1+p^2)}}$; and, therefore, by formula [a]

$$\pi y^2 - a\sqrt{(1+p^2)} = c - \frac{ap^2}{\sqrt{(1+p^2)}};$$

and therefore

$$\sqrt{(1+p^2)} = \frac{a}{\pi y^2 - c};$$

which, by reduction, becomes

$$p, \text{ or } \frac{\dot{y}}{\dot{x}} = \frac{\sqrt{[a^2-(\pi y^2-c)^2]}}{\pi y^2 - c}; \text{ or,}$$

$$\dot{x} = \frac{(\pi y^2 - c)}{\sqrt{[a^2-(\pi y^2-c)^2]}}\,\dot{y};$$

which, if $c = 0$, reduces to

$$\dot{x} = \frac{\pi y^2}{\sqrt{(a^2-\pi^2y^4)}}\,\dot{y}.$$

This laſt reſult agrees with Simpſon's, but it is reſtricted, becauſe c is not neceſſarily equal to 0.

Prob. VIII.

The length of a curve being given, it is required to determine its nature, when the area is a maximum.

Here, by proceeding as in the foregoing examples, we ſhall have

$$V' = \sqrt{(1+p^2)} - ay,$$

and therefore,

$$P = \frac{p}{\sqrt{(1+p^2)}};$$

and hence, by means of the formula [a],

$$\sqrt{(1+p^2)} - ay = \frac{p^2}{\sqrt{(1+p^2)}} + c.$$

Therefore,

$$\frac{1}{\sqrt{(1+p^2)}} = c + ay,$$

which, being farther reduced, becomes

$$p = \frac{\dot{y}}{\dot{x}} = \frac{\sqrt{[1-(c+ay)^2]}}{(c+ay)},$$

$$\text{or,}\quad \dot{x} = \frac{(c+ay)\,\dot{y}}{\sqrt{[1-(c+ay)^2]}},$$

the fluents of which being taken, we have

$$x = c' - \sqrt{[1-(c+ay)^2]},$$

which is an equation to a circle.

Prob. IX.

Required the curve that generates the ſolid of the leaſt ſurface, the area being given.

Here $V = 2\pi y\sqrt{(1+p^2)}$, and $u = y$; therefore V', or $V - au = 2\pi y\sqrt{(1+p^2)} - ay$,

and $V' = [2\pi\sqrt{(1+p^2)} - a]\,\dot{y} + \frac{2\pi yp}{\sqrt{(1+p^2)}}\dot{p}$;

whence, by compariſon with formula [A],

$$P = \frac{2\pi yp}{\sqrt{(1+p^2)}};$$

then, again, by formula [a], we have

$$2\pi y\sqrt{(1+p^2)} - ay = \frac{2\pi yp^2}{\sqrt{(1+p^2)}} + c,$$

which, by reduction, becomes

$$p = \frac{\dot{y}}{\dot{x}} = \frac{\sqrt{[4\pi y^2-(c+ay)^2]}}{c+ay}, \text{ or,}$$

$$\dot{x} = \frac{(c + ay)\,\dot{y}}{\sqrt{[4\pi y^2 - (c + ay)^2]}}.$$

If, inſtead of the area, the length of the curve had been given, then we ſhould have had

$$\int u\,\dot{x} = \int \dot{z} = \int \dot{x}\,\sqrt{(1 + p^2)}\ ;\ \text{and}\ u = \sqrt{(1 + p^2)}.$$

Therefore $V' = 2\pi y\,\sqrt{(1 + p^2)} - a\,\sqrt{(1 + p^2)}$, and conſequently, by formula [A],

$$P = \frac{2\pi y p - a p}{\sqrt{(1 + p^2)}};$$

whence, again, by formula [a], we have

$$(2\pi y - a)\,\sqrt{(1 + p^2)} = \frac{(2\pi y - a)\,p^2}{\sqrt{(1 + p^2)}} + c;$$

whence, by reduction,

$$\dot{x} = \frac{c\,\dot{y}}{\sqrt{[(2\pi y - a)^2 - c^2]}},$$

the fluents of which expreſſion being taken, gives

$$x = \frac{c}{2\pi}\ \text{hyp. log.}$$

$$[(2\pi y - a) + \sqrt{(2\pi y - a)^2 - c^2}] + c';$$

and therefore the required curve is the catenary.

Prob. X.

Of all iſoperimetrical curves, drawn between B and N, (*fig.* 15.) to find B F N ſuch, that B Z N ſhall contain the greateſt area, P Z being a function of P F. See the foregoing hiſtorical ſketch.

Let P F = y, and P Z a function of y = Y; then $\int V\,\dot{x}$ correſponds to $\int Y\,\dot{x}$; and $\int u\,\dot{x}$ to $\int \sqrt{(1 + p^2)}\,\dot{x}$.

Hence $V + a\,u$, or $V' = Y + a\,\sqrt{(1 + p^2)}$,

and $$\dot{V} = \frac{\dot{Y}\,\dot{y}}{\dot{y}} + \frac{a\,p\,\dot{p}}{\sqrt{(1 + p^2)}};$$

whence we have, by compariſon of formula [A],

$$P = \frac{a p}{\sqrt{(1 + p^2)}};$$

and hence, again, by form [a] is deduced

$$Y + a\,\sqrt{(1 + p^2)} = \frac{a p^2}{\sqrt{(1 + p^2)}} + c,$$

or, $$\frac{a}{\sqrt{(1 + p^2)}} = c - Y,$$ and by reduction

$$p = \frac{\dot{y}}{\dot{x}} = \frac{\sqrt{[a^2 - (c - Y)^2]}}{c - Y};$$

and conſequently,

$$\dot{x} = \frac{(c - Y)\,\dot{y}}{\sqrt{[a^2 - (c - Y)^2]}},$$

the equation of the curve.

In the equation, as it ſtands, there are two arbitrary undetermined quantities a and c. The integration of the equation would introduce a third; and to determine theſe three, we have given the two points B and N, and the length of the curve.

ISOPOGON, in *Botany*, from ισος, *equal*, and πωγων, *a beard*, becauſe the ſeeds are every where equally bearded. Brown Tr. of Linn. Soc. v. 10. 71. Prodr. Nov. Holl. v. 1. 365. Claſs and order, *Tetrandria Monogynia.* Nat. Ord. *Proteaceæ.*

Eſſ. Ch. Perianth (rather corolla) four-cleft, with a ſlender permanent tube. No ſcales under the germen. Style entirely deciduous. Stigma tapering or cylindrical. Nut ſeſſile, ſwelling, hairy all over. *Brown.*

Mr. Brown, in the places above quoted, defines 12 ſpecies of this genus, all natives of New Holland, ſuch of which as have come under the notice of other botaniſts have been confounded with the Linnæan *Protea.* They are rigid ſhrubs, with ſmooth *leaves,* which are either flat or thread-ſhaped, divided or entire. *Heads* terminal, rarely axillary. *Flowers* either very denſely imbricated in the form of a globoſe *ſtrobilus,* or faſtigiate on a flattiſh common receptacle, furniſhed with more or leſs of an involucrum, and beſet with crowded deciduous ſcales.—Examples of this genus are

I. *anethifolius.* (Protea anethifolia; Saliſb. Prodr. 48. P. acufera; Cavan. Ic. v. 6. 33. t. 549.)—Leaves once or twice pinnatifid, thread ſhaped, furrowed above: their ſegments nearly erect. Branches ſmooth. Tube of the flower downy; ſegments ſmooth, bearded at the tip.—Native of heathy ground on the eaſt coaſt of New Holland, near Port Jackſon.

I. *anemonifolius.* (Protea anemonifolia; Saliſb. Prodr. 48. Sims in Curt. Mag. t. 697. Andr. Repoſ. t. 332. P. tridactylides; Cavan. Ic. v. 6. 33. t. 548.)—Leaves once or twice three-cleft; ſegments linear, flat, rather ſpreading, ſmooth beneath. Scales of the cone ſpongy.—Found on ſtony heaths near Port Jackſon. The *flowers* are yellow.

We confeſs this genus ſeems too nearly related to Mr. Brown's *Petrophila,* with which it agrees altogether in habit, differing chiefly in the fruit of *Petrophila* being only partially hairy. To this latter belongs *Protea pulchella,* figured by Dr. Sims in Curt. Mag. t. 796.

ISOPSEPHUS, Ισοψηφος, in *Antiquity,* an appellation given to judges, who had equal juriſdiction and authority; it was likewiſe applied to a caſe where the votes were equal on both ſides. Another ſenſe is given to it, *viz.* when the letters of different words make up the ſame ſum, they were ſaid to be ισοψηφα ῥηματα; for the Greeks had no other cyphers to number with but the letters of their alphabet; ſo that α ſignified one, β two, γ three, &c. But beſide words, the ancients had likewiſe whole verſes of this kind; and it is pretended that there are ſeveral ſuch verſes in Homer. Hiſt. Acad. Inſcript. vol. iii. p. 311, ſeq.

ISOPYRUM, in *Botany,* from ισος, *equal* or *like,* and πυρος, *wheat,* a name adopted from Dioſcorides, whoſe ισοπυρον, however, is very difficult to aſcertain. He deſcribes it as having the leaf terminated by a tendril. Various plants have been taken for it by different botaniſts, amongſt others, ſurely with little probability, the *Aquilegia,* or Columbine, which we mention here becauſe it appears to have induced Linnæus to chooſe the name for the preſent genus, very much akin to *Aquilegia,* and ſtill more diſtinguiſhed for delicacy and elegance.—Linn. Gen. 282. Schreb. 378. Willd. Sp. Pl. v. 2. 1334. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 271. Saliſb. Tr. of Linn. Soc. v. 8. 306. Juſſ. 233. Gærtn. t. 65.—Claſs and order, *Polyandria Polygynia.* Nat. Ord. *Multiſiliquæ,* Linn. *Ranunculaceæ,* Juſſ.

Gen. Ch. *Cal.* none. *Cor.* Petals five, ovate, equal, ſpreading, deciduous. Nectaries five, equal, tubular, very ſhort, inſerted into the receptacle within the petals, three-lobed at their orifice, the outer lobe largeſt. *Stam.* Filaments numerous, capillary, ſhorter than the corolla; anthers ſimple. *Piſt.* Germens ſeveral, ovate or oblong, ſuperior, ſeſſile, ſtyles ſimple, ſcarcely ſo long as the germens; ſtigmas obtuſe. *Peric.* Capſules ſeveral, ſeſſile, leguminous, oblong, of one cell and one valve, keeled at the outſide, burſting at the inner edge. *Seeds* numerous, attached in two rows to the edge of the capſule.

Eſſ. Ch. Calyx none. Petals five, deciduous. Nectaries tubular, three-cleft. Capſules ſeſſile, of one cell and one valve. Seeds numerous, marginal.

1. I. *fumarioides.* Linn. Sp. Pl. 783. (Helleborus fumariæ foliis; Ammann. Ruth. 74. t. 12.)—Stipulas awl-ſhaped. Leaflets pinnatifid. Capſules nearly cylindrical.—Native of moiſt ſhady places, near rivers, in Siberia, flowering in ſpring and ſummer. It is ſometimes cultivated in gardens, as being not only curious, but an elegant little annual plant, with the habit and glaucous hue of a *Fumaria*, to ſeveral of which genus its *leaves* bear a great reſemblance, in their pinnatifid obovate leaflets. The *flowers*, however, are totally different, reſembling a *Thalictrum*, ſmall, whitiſh, ſhort-lived, on long ſimple ſtalks. *Capſules* about ten or fifteen, ſpreading, pale green, near half an inch long, pointed with the permanent ſtyles.

2. I. *thalictroides.* Linn. Sp. Pl. 783. Jacq. Auſtr. t. 105.—Stipulas ovate. Leaflets three-cleft, dilated. Capſules ovate.—Native of ſhady rather moiſt places, in the mountains of Italy, Carniola, Auſtria, &c. flowering in April and May, and ſoon ripening its ſeed. *Root* creeping, perennial. *Stem* a ſpan high or more, naked below, ſmooth. *Leaves* ternate, leaflets more or leſs three-cleft, broadiſh, ſmooth, reſembling thoſe of an *Aquilegia*, or *Thalictrum.* *Flowers* white, with yellow ſtamens, not unlike ſome ſmall *Anemone.* *Capſules* only two or three, ovate, on a globular receptacle.

Such are the only certain ſpecies. I. *aquilegioides* of Linnæus appears to be a nonentity, its ſynonyms, as far as they can be made out, belonging to *Aquilegia viſcoſa*, which is Haller's *Iſopyrum*, n. 1190.

Mr. Saliſbury, in Tr. of Linn. Soc. v. 8. 305, has eſtabliſhed, by the name of *Coptis*, a very natural genus, though diſtinguiſhed from *Iſopyrum* chiefly by having ſtalked germens and capſules. Of this one ſpecies is *Helleborus trifolius* of Linnæus, Fl. Dan. t. 566; the other is C. *aſplenifolia* of Saliſbury, of which we have ſpecimens and a drawing from Mr. Menzies, who gathered the plant on the weſt coaſt of North America. This laſt, ſtrange to tell! appears, by ſpecimens from Thunberg, to be his *Thalictrum japonicum*, Tr. of Linn. Soc. v. 2. 337, called in Fl. Jap. 364. *Didynamiſta Salviæ ſimilis*, though nothing can be leſs ſuitable than the latter deſcription. He informs us he had never ſeen the flower, only the fruit.

ISORA, a Malabar name for ſome ſpecies of the *Helicteres* of Linnæus, and adopted by Plumier to deſignate that genus. See Helicteres.

ISOSCELES Triangle, of ισος, *equal*, and σκελος, *leg*, is a triangle which has two equal ſides. In an iſoſceles triangle, FDE (*Plate* VIII. *Geometry*, *fig.* 105.) the angles *y* and *u*, oppoſite to the equal ſides, are equal: and a line drawn from the top or vertex F, cutting the baſe into two equal parts, is perpendicular to the baſe. The ſame line alſo biſects the vertical angle of the triangle. It appears likewiſe that if the equal ſides be produced, the angles under the baſe will be equal, the ſum of thoſe above and below reſpectively being equal to two right angles. And if the vertical angles of two iſoſceles triangles be equal, the two triangles will be equiangular. Moreover, every equilateral triangle muſt be equiangular.

ISOTONIC *Scale of Muſic*, or the Equal Temperament Scale, is that in which the octave is divided into twelve equal parts; of courſe, each half note is equal $1 \div \sqrt[12]{2} = 51\Sigma + f + 4\frac{5}{12}m$, which is ſometimes called a mean ſemitone, and this, a ſyſtem of mean ſemitones. The following table ſhews ſome of the moſt uſeful particulars of this ſyſtem, *viz.*

1	2	3	4
C	.6989700	.50000	$612\Sigma + 12f + 53\ m$
B	.7240558	.52973	$561\Sigma + 11f + 48\frac{7}{12}m$
b B	.7491417	.56123	$510\Sigma + 10f + 44\frac{1}{6}m$
A	.7742275	.59460	$459\Sigma + 9f + 39\frac{3}{4}m$
※ G	.7993133	.62996	$408\Sigma + 8f + 35\frac{1}{3}m$
G	.8243992	.66742	$357\Sigma + 7f + 30\frac{11}{12}m$
※ F	.8494850	.70710	$306\Sigma + 6f + 26\frac{1}{2}m$
F	.8745708	.74915	$255\Sigma + 5f + 22\frac{1}{12}m$
E	.8996567	.79370	$204\Sigma + 4f + 17\frac{2}{3}m$
b E	.9247425	.84090	$153\Sigma + 3f + 13\frac{1}{4}m$
D	.9498283	.89090	$102\Sigma + 2f + 8\frac{5}{6}m$
※ C	.9749142	.94387	$51\Sigma + f + 4\frac{5}{12}m$
C	.0000000	1.00000	
Notes.	Common Logarithms.	Lengths of Strings.	Farey's Notation of the Intervals.

The laſt column of this table was publiſhed in the Philoſophical Magazine, vol. xxix. p. 347; in the xxxvith vol. p. 47, ſchol. 7, the temperaments of the concords in this ſyſtem will be found, and in vol. xxxv. p. 452, the beats of all the concords. Broadwood and ſome other tuners of pianofortes pretend, it is ſaid, that they tune them to an equal temperament, but which is very much to be doubted. On the organ, it ſeems clear, as Mr. Smyth obſerves in the Phil. Mag. vol. xxxvi. p. 435, that an equal temperament never has been, and we may perhaps ſay, never will be practiſed: however many advocates this ſyſtem may have had among ſpeculative writers, among whom have been mentioned D'Alembert, Cavallo, Chladni, Couperin, Davis, Des Cartes, Emerſon, Marpurg, Merrick, Merſennus, Rameau, Ricci, &c. Mr. Farey, in propoſing what he calls his equal temperament, in the Phil. Mag. vol. xxviii. p. 65, expreſsly ſtated his object to be, to enable thoſe to tune it who might wiſh to try it, and not as recommending its adoption. See Equal Temperament.

ISPAHAN, in *Geography*, the capital city of modern Perſia, ſituated in the province of Irak, on the ſmall river Zenderud, which riſes in the mountains of Galabat, three days' journey towards the north; but Abas the Great, at a prodigious expence, pierced ſome mountains about 30 leagues from Iſpahan, and introduced another ſtream, ſo that the Zenderud was as large during the ſpring, as the Seine at Paris in the winter; for, in that ſeaſon, the ſnows on the high range of mountains melted, and very much ſwelled the river. The city is ſurrounded by walls of earth, which are ſuffered to remain in bad repair, and which are concealed by the adjoining houſes and gardens. It has eight gates, which, according to Chardin, could not be ſhut; and its ſtreets are narrow, devious, and badly paved. This writer computes its circuit, the ſuburbs included, at about 24 miles, and its inhabitants, by the loweſt eſtimate, at 600,000. But the royal ſquare, or Meidan Shah, and its grand market, the palace of the Sefi, and thoſe of the grandees, the moſques, the public bath, and other edifices, are magnificent and ſplendid. Its canals, the plantations of lofty plane trees on both ſides of the ſtreets, and the frequent waterings of them, contribute not only to its beauty, but its ſalubrity. The royal ſquare is 440 paces long, and 160 broad, and is ſurrounded with a canal built with bricks, cemented with black mortar, which in time becomes harder than free-ſtone. The royal moſque is ſituated at the S. end of this ſquare, and its portico is richly ornamented with a thouſand figures of a rich profuſion of gold and azure; the whole being alſo inlaid with enamelled ſquares, and a frieze encompaſſing it of the ſame materials. The royal palace, and the "haram," or women's apartment, are very ſplendid buildings. The former is nearly five miles in compaſs; its great portico ſtands in the royal ſquare, and is built to a great height with porphyry. By the Perſians it is regarded as ſacred. The ſuburb of Julfa, or Yulfa, was very large, and poſſeſſed by the Armenians, whoſe cemetery was near the mountains of Iſpahan, called Kou Sofa, or a mountain in the form of a terrace, and alſo Tag Ruſtan, the hill or throne of Ruſtan. This city is ſaid to be encompaſſed by 1460 villages, the inhabitants of which ſubſiſt chiefly by their manufactures of ſilk and wool. Its environs are pleaſant, and much diverſified by the vicinity of mountains. Iſpahan was taken by Timur Bec in the year 1387; when the inhabitants ranſomed their lives by the payment of a large ſum; but an inſurrection happening in the night, Timur ordered all the inhabitants to be put to the ſword; and in this maſſacre it is computed that 70,000 perſons were killed by the ſoldiers, and their heads piled in heaps on the walls of the city. In 1722, it was taken by the Afghans, under Mahmoud, after a long ſiege, which occaſioned the death of many of its inhabitants by famine. In 1727 it was recovered from the Afghans by Nadir Shah. By theſe repeated attacks, Iſpahan was greatly reduced, ſo that a Perſian merchant aſſured Mr. Hanway that not above 5000 houſes were inhabited. N. lat. 32° 24′ 34″. E. long. 51° 50′.

ISPIDA, or KING-FISHER, in *Ornithology*. See ALCEDO.

ISPIRA, in *Geography*, a town of Turkiſh Armenia; 74 miles N.E. of Erzerum.

ISQUINTIA, a town of Mexico, in the province of Guatimala; 30 miles W.N.W. of Guatimala. N. lat. 14° 32′. W. long. 93°.

ISQUITENANGO, a town of Mexico, in the province of Yucatan; 90 miles S. of Chiapa dos Eſpagnols.

ISQUITEPIC, a town of Mexico, in the province of Guaxaca; 40 miles W.N.W. of Guaxaca.

ISRAEL, in *Scripture Hiſtory*, Heb. ישראל, who prevails with God, formed of ישרה, *ſharah*, to govern, and אל, *el*, God, a name given to the patriarch Jacob by the angel who wreſtled with him at Mahanaim, or Penuel, Gen. xxxii. 1, 2. 28, 29, 30. This name was afterwards applied to the deſcendents of Jacob in general, hence called Iſraelites, as well as to Jacob himſelf, and alſo to the ten tribes who formed a kingdom diſtinct from that of Judah. Theſe tribes revolted during the reign of Rehoboam, under the conduct of Jeroboam, who became head of this new monarchy, ſtyled "the kingdom of Iſrael" in oppoſition to that of Judah. See JEWS.

ISSA, in *Ancient Geography*, a town of the iſland of Leſbos; more anciently called Himera.—Alſo, an iſland of Illyria, in the Adriatic gulf, upon the coaſt of Dalmatia, with a town of the ſame name. Strabo mentions it as a very celebrated iſland.

ISSACHAR, one of the twelve tribes of Iſrael, derived from the fifth ſon of Jacob, whoſe lot was aſſigned to him in one of the beſt parts of the land of Canaan. It was ſituated in Lower Galilee, and bounded by the Mediterranean on the W., by Zebulon on the N., by the Jordan on the E., which parted it from that of Gad, and on the S. by the half tribe of Manaſſeh. Its moſt remarkable places were mounts Carmel and Gilboah, the valley of Jezreel, and the great plain of Megiddo, called alſo the plain of Galilee, and now Saba, from a caſtle built upon it, and famed, like that of Jezreel, for the many battles fought upon it, and alſo for the abundance of corn, wine, oil, &c. which it produced.

ISSAGUNGE, in *Geography*, a town of Hindooſtan, in Oude; 35 miles N.E. of Kairabad.

ISSAPOUR, a town of Hindooſtan, in Oude; 25 miles N.E. of Lucknow.

ISSAWARRA, a town of Hindooſtan, in Oude; 15 miles S.E. of Kairabad.

ISSE HEAD, a cape of Denmark, at the northern extremity of the iſland of Samſoe. N. lat. 56° 3′. E. long. 10° 26′.

ISSEDON, or ESSEDON, in *Ancient Geography*, a town of Scythia, on the other ſide of the Imaus.—Alſo, a town of Serica, ſituated E.N.E. of the former.

ISSEDONES, or ESSEDONES, a people of Serica according to Ptolemy; but Pomponius Mela places them in the vicinity of the Palus-Mæotides; Pliny joins them to the Sauromatæ, and aſſigns them an habitation near the Colchide. Herodotus ſpeaks of Iſſidones as neighbours to the Maſſagetæ, as a numerous people, and living to the W. of the Caſpian ſea. Herodotus, who ſpeaks of the cuſtoms and religion of the Iſſidones (l. iv.), ſays, that when any one of them has loſt his father, all his relations bring him a number of cattle, whoſe carcaſſes they cut in pieces, and in the ſame manner cutting the body of the deceaſed father, they mix all the pieces of fleſh together, and ſerve them up at an entertainment, reſerving only the head of the deceaſed parent, which they ſet in gold, and uſe as an idol, to which they every year offer ſolemn ſacrifices.

ISSELBURG, in *Geography*, a town of the duchy of Cleves, on the Iſſel, containing a Lutheran and Calviniſt church; 14 miles E.N.E. of Cleves. N. lat. 51° 53′. E. long. 6° 35′.

ISSELMOND, an iſland in the river Meuſe, oppoſite to Rotterdam, with a town in it of the ſame name.

ISSELORT, a town of Holland, in Guelderland; ſituated at the ſeparation of the Rhine and Iſſel near Arnheim.

ISSELSTEIN, a town of Holland, belonging to the ſtate of Utrecht, and ſeated on the river Iſſel; it is the capital of a ſmall territory formerly belonging to William III. king of England; five miles S. of Utrecht.

ISSENBRON, a town of Bavaria, in the principality of Aichſtatt; ſix miles E.N.E. of Aichſtatt.

ISSER, a river of Algiers, which joins the Tafna, near its mouth; anciently called "Aſſanus."

ISSESUCAR, a town on the S. coaſt of the iſland of Java; 70 miles S.W. of Batavia.

ISSICUS SINUS, in *Ancient Geogrophy*, a gulf of the Mediterranean ſea, between Syria and Cilicia.

ISSIGEAC, in *Geography*, a town of France, in the department of the Dordogne, and chief place of a canton, in the diſtrict of Bergerac; nine miles S.S.E. of Bergerac. The place contains 879, and the canton 8316 inhabitants, on a territory of 210 kiliometres, in 21 communes.

ISSIN, a town of Perſia, in the province of Kerman, whither many of the inhabitants of Gomron retreat during the unhealthy ſeaſon; ſix miles N. of Gomron.

ISSINI, a kingdom of Africa, on the Ivory Coaſt, conſiſting of 12 or 13 villages. From the Rio de Suero da

Coſta to cape Apollonia, the coaſt is low and even, extending itſelf for a courſe of 12 miles eaſtward, bordered with large trees, and covered with villages, the chief of which are Boqun, Iſſini Peguena, Great Iſſini, Albiani, Tabo, and Akanimina. The firſt ſtands at a ſmall diſtance from the ſhore, near the mouth of the river Da Coſta, ſurrounded by woods and pleaſantly ſituated. Iſſini Peguena, and Great Iſſini, are both ſituated on the ſea-coaſt, at the diſtance of three or four miles, and between them is a number of villages. Three of them are conſiderable. Great Iſſini is built at the entrance of a ſmall river, which, during the dry ſeaſon, is loſt in the ſands, but diſcharges itſelf into the ſea during the rainy months. This town was pillaged and burnt by the inland Negroes in 1681; but has ſince recovered its importance by the addition of a great number of houſes and inhabitants. Where the river empties itſelf into the ſea, it forms a ſmall iſland, very commodious for building a fort; but no ſuch defence has been attempted by the Europeans. Great Iſſini is celebrated for the purity of its gold, which probably comes from the kingdom of Aſſiento, at the ſource of the Rio de Suero da Coſta, a country rich in gold, but little known to the Europeans. Eaſt of Iſſini are the little diſtricts and towns of Albiani and Tabo, the former ſix miles and the latter ten from it, both ſurrounded by high groves of palms, ſeen at a great diſtance at ſea, and much frequented by European ſhipping. A mile further eaſt, and half a mile weſt of cape Apollonia, ſtands the village Akanimina, on a riſing ground; commanding an extenſive ſea and land proſpect. The interior country between Boqun and this village, is high, rugged, and mountainous, but affording ſome fine gold, ivory, and formerly a few ſlaves. The gold duſt of theſe two places is commonly found at the depth of ſix fathoms, for two miles along the coaſt; and the Negroes mix it with pulverized copper ſo expertly, that it requires touching to diſcover the fraud.

ISSOIRE, a town of France, and principal place of a diſtrict, in the department of the Puy de Dôme, ſeated on the Couze, near the Allier; 15 miles S.W. of Clermont. The place contains 5095, and the canton 14,696 inhabitants, on a territory of 155 kiliometres, in 15 communes. N. lat. 45° 32′. E. long. 3° 19′.

ISSONG, in *Botany*, a name given by the people of Guinea to a ſpecies of plant, which they infuſe in water, and afterwards boil, and then waſh the head with it, as a cure for all kinds of the head-ach. It is a plant deſcribed by the botanical writers under the name of piſum veſicarium fructu nigro, alba macula notato, the bladder pea, with a black fruit marked with a white ſpot; and called by the people of Malabar, where it alſo grows very plentifully, *ulinga*. It is alſo found in Barbadoes and Jamaica, and is there called *parſley*. Phil. Tranſ. N° 232.

ISSOUDUN, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Indre, on the Theols; 18 miles N.E. of Chateauroux. The place contains 10,156, and the two cantons into which it is divided 23,297 inhabitants, on a territory of 662½ kiliometres, in 27 communes. This place has conſiderable manufactories. N. lat. 46° 56′ 9″. E. long. 1° 59′ 12″.

ISSUABLE Terms, in *Law*, a name applied to Hilary or Trinity terms, from the making up of the iſſues in thoſe terms.

ISSUANT, Issuing, in *Heraldry*, is underſtood of a lion, or other animal, in a coat of arms, that ſeems juſt coming out from under a chief, feſſe, a houſe, a wood, or the like; and only ſhews half his body.

It is not very eaſy to diſtinguiſh the lion iſſuant from the lion naiſſant: ſome ſay the iſſuant is that which comes out from the bottom of the chief, ſhewing his head, neck, the tip of his fore-legs and his tail, againſt the chief of the coat; whereas the naiſſant has its riſe about the middle of the field, and ſhews all his fore-part, with the tip of his tail, as if he were riſing out of the earth.

ISSUE, in *Common Law*, has divers applications, being ſometimes taken for the children begotten between a man and his wife—ſometimes for profits growing from amercements or fines—ſometimes for profits of lands and tenements—but more frequently for the point of matter depending in ſuit, whereupon the parties join, and put their cauſe to the trial of the jury.

On all theſe occaſions, iſſue has but one ſignification, which is, an effect of a cauſe preceding: as the children are the effect of the marriage between the parents; the profits growing to the king or lord, from the puniſhment of any man's offence, are the effect of his tranſgreſſion; the point referred to the trial of twelve men, is the effect of pleading or proceſs.

Iſſues concerning cauſes are of two kinds; that upon matter of fact, and that upon matter of law. An iſſue in *fact* is when the plaintiff and defendant have agreed upon a point to be tried by a jury; and iſſue in *law* is when there is a demurrer to a declaration, plea, &c. and a joinder in demurrer, which is an iſſue at law to be determined by the judges. (See Demurrer.) Iſſues in *fact* are either *general* or *ſpecial*. *General*, ſeems to be that whereby it is referred to the jury to bring in their verdict, whether or no the defendant hath done any ſuch thing as the plaintiff lays to his charge.

For example, if it be an offence againſt any ſtatute, and the defendant plead not guilty; this being put to the jury, is called the *general iſſue*.—So, if a man complains of a private wrong, which the defendant denies, and pleads no wrong, nor diſſeiſin; and this be referred to the jury; it is likewiſe the general iſſue. *Special*, is that, wherein ſpecial matters being alleged by the defendant in his offence, both parties join on this point, and ſo go to a demurrer, if it be *quæſtio juris*; or elſe to a trial by the jury, if it be *quæſtio facti*: as in aſſault and battery, where the defendant pleads that the plaintiff ſtruck firſt.

Issue, *Collateral*. See Reprieve.

Issue, *Feigned*, in *Chancery*, is uſed when a matter of fact is ſtrongly controverted, and the court directs the matter to be tried by a jury: but as no jury can be ſummoned to attend this court, the fact is uſually directed to be tried at the bar of the court of king's bench, or at the aſſizes upon a feigned iſſue. For, in order to bring it there, and have the point in diſpute, and that only, put in iſſue, an action is brought, wherein the plaintiff, by a fiction, declares that he laid a wager of 5*l.* with the defendant, that A was heir at law to B, and then avers that he is ſo, and therefore demands the 5*l.* The defendant allows the feigned wager, but avers that A is not the heir to B: and thereupon that iſſue is joined, which is directed out of chancery to be tried, and thus the verdict of the jurors at law determines the fact in the court of equity. Theſe feigned iſſues ſeem to be borrowed from the *ſponſio judicialis* of the Romans; and are alſo frequently uſed in the courts of law, by conſent of the parties, to determine ſome diſputed right without the formality of pleading, and thereby to ſave much time and expence in the deciſion of a cauſe. Blackſt. Com. book iii. p. 452.

Issues *on Sheriffs* are for neglects and defaults, by amercement and fine to the king, levied out of the iſſues and profits of their lands; and double or treble iſſues may be laid on a ſheriff.

a ſheriff for not returning writs, &c. But they muſt be taken off before they are eſtreated into the exchequer, by rule of court, on good reaſon ſhewn. Iſſues ſhall be levied on jurors, for non-appearance; though on reaſonable excuſe proved by two witneſſes, the juſtices may diſcharge the iſſues. See DISTRESS, DISTRINGAS, and PROCESS.

ISSUE denotes, in *Surgery*, an ulcer made deſignedly by the practitioner, and kept open a certain time, or even the patient's whole life, for the cure or prevention of a variety of diſeaſes. The phyſician, in his practice, has frequent occaſion to recommend the making of an iſſue, and the ſurgeon finds it a principal means of relief in ſeveral important caſes; as, for inſtance, the white-ſwelling, the diſeaſe of the hip-joint, caries of the vertebræ, &c. Many perſons are never in health, or at leaſt fancy themſelves always ill, unleſs they have an iſſue in ſome part of their body or another. Making an iſſue, indeed, is not unfrequently conſidered as an imitation of nature, who, of her own accord, often forms ulcers in various parts of the body (as is not uncommonly conjectured) for the purpoſe of diſcharging pernicious humours, whereby people are ſuppoſed to be freed from grievous diſorders, and have their health preſerved. The humoral pathologiſts were exceſſively partial to theſe notions, which, at the preſent time, will be found by every experienced practitioner to influence the maſs of mankind, and render the formation of iſſues more common than perhaps is conſiſtent with the better eſtabliſhed principles of medical ſcience. Few old ſubjects will allow a ſore of long ſtanding to be dried up, (as the expreſſion is,) without requiring the ſurgeon immediately afterwards to make an iſſue for them. When an ulcer has exiſted a great length of time, the conſtitution may poſſibly become ſo habituated to it, that the health may really ſuffer from its being healed. We have often ſeen aſthmatic complaints, and ſevere head-aches follow the cicatrization of an old ulcer; but whether they would have happened, if an iſſue had been made in time, we cannot undertake to determine poſitively, though the plan is commendable both as rational and exempt from danger. Whatever may be the ſolidity of the theories which have been offered by medical writers in regard to iſſues, the practitioner, who has his eyes open, cannot fail to ſee the benefit often derived from ſuch means; and if there be any unqueſtionable facts in medicine and ſurgery, we may confidently ſet down amongſt them the frequent poſſibility of relieving one diſeaſe by exciting another of a leſs grievous and more curable nature.

Surgeons of the preſent day have only two ways of making an iſſue; one is with a lancet, or ſcalpel; the other with cauſtic.

The place for the iſſue being fixed upon, the ſurgeon and his aſſiſtant are to pinch up a fold of the integuments, and with a lancet, or knife, make in them an inciſion of ſufficient ſize to hold a pea, or as many peas as may be thought proper. The pea or peas are then to be placed in the cut, and covered with a piece of adheſive plaſter, a compreſs and bandage. The peas firſt inſerted need not be removed for three or four days, when ſuppuration will have begun; but the iſſue is afterwards to be cleaned and dreſſed every day, and have freſh peas put into it. The preceding is the ordinary method of making ſuch iſſues as are intended to contain only one or two peas.

When the iſſue is to be larger, which is generally proper in caſes of diſeaſed vertebræ, white-ſwellings, &c. the beſt plan is to deſtroy a portion of the integuments with cauſtic. The kali purum, blended with quicklime, is moſtly preferred for this purpoſe. The ſituation and ſize of the iſſue having been determined, the ſurgeon is to take care that the cauſtic does not extend its action to the ſurrounding parts. With this view he is to take a piece of adheſive plaſter, and having cut a hole in it of the exact ſhape and ſize of the iſſue intended to be made, he is to apply it to the part. Thus the plaſter will defend the adjacent ſkin from the effects of the cauſtic, while the uncovered portion of integuments, correſponding to the hole in the plaſter, is that which is to be deſtroyed. The cauſtic is to be taken hold of with a bit of lint or tow, and its end, having been a little moiſtened with water, is to be ſteadily rubbed upon the part of the ſkin where the iſſue is to be formed. The frictions are to be continued, till the whole ſurface intended to be deſtroyed aſſumes a darkiſh corroded appearance. The cauſtic matter may now be carefully waſhed off with ſome wet tow. The plaſter is to be removed, and a linſeed poultice applied. As ſoon as the eſchar is detached, or any part of it is looſe enough to be cut away without pain or bleeding, the peas are to be inſerted and confined in their proper place with a piece of adheſive plaſter. Some uſe beans for the purpoſe; others beads, which anſwer very well, and have the advantage of ſerving for any length of time, when waſhed and cleaned every day. If the iſſue is at all of a longitudial ſhape, the peas, beans, or beads may be more eaſily kept in their places when ſtrung upon a thread.

Iſſues ought always to be made, if poſſible, in a ſituation where the peas will not be much diſturbed in the ordinary motions of the body, nor interfere with the actions of the muſcles. The interſpaces between the margins and inſertions of muſcles are deemed the moſt eligible places. Thus, iſſues in the arm are uſually made juſt at the inferior angle of the deltoid muſcle, by the ſide of the external edge of the biceps. In the lower extremities iſſues are often made at the inner ſide of the thigh, immediately above the knee, in a cavity readily felt there with the fingers. Sometimes iſſues are made upon the inſide of the leg, juſt below the knee. The nape of the neck is a common place for them. In caries of the vertebræ they are made on each ſide of the ſpinous proceſſes. In diſeaſed hips they are formed in a depreſſion juſt behind and below the trochanter major. When the nature of the caſe does not fix the ſituation of an iſſue particularly, the arm ſhould be preferred to the leg, as iſſues upon the upper extremity, eſpecially the left arm, are much leſs annoying than upon either of the lower limbs.

The great art of keeping an iſſue open for a long while, is always to maintain an equal and effectual preſſure upon the peas, by which means they will be confined in their places, and the granulations hindered from riſing. Compreſſes of paſteboard and ſheet lead will often be found highly ſerviceable.

IS-SUR-TILLE, in *Geography*, a town of France, in the department of the Côte d'Or, and chief place of a canton, in the diſtrict of Dijon; 4 miles N. of Dijon. The place contains 1598, and the canton 10,170 inhabitants, on a territory of 355 kiliometres, in 23 communes. N. lat. 47° 30′. E. long. 5° 9′.

ISSUS, in *Ancient Geography*, a town of Aſia, in Cilicia, ſituated on the ſea coaſt. This town was large, rich, and populous. It is famous for the battle fought by Alexander in the year 333 B.C. in which he defeated the Perſians, and took as priſoners the wife, mother, and daughters of Darius.

ISSY L'EVEQUE, in *Geography*, a town of France, in the department of the Saône and Loire, and chief place of a canton, in the diſtrict of Autun; 19 miles S.S.W. of Autun. The place contains 1715, and the canton 5349 inhabitants, on a territory of 220 kiliometres, in 7 communes.

ISTAD, St. a ſmall iſland in the Grecian Archipelago, near the S.E. coaſt of Argentiera.

ISTAKAR, a town of Perſia, in the province of *Farſiſtan* (which ſee), at a ſmall diſtance N. of Shiraz.

ISTAN, a town of Spain, in the province of Grenada; 6 miles S.E. of Monda.

ISTANNA, a country of Africa, E. of Benin.

ISTAPA, a town of Mexico, in the province of Culiacan; 40 miles E. of Culiacan.

ISTAPAN, a town of Mexico, in the province of Guadalajara; 15 miles N.E. of St. Miguel.

ISTECHIA, a town of the Morea, in the gulf of Coron; 7 miles S. of Scardamula.

ISTEFAN, a town of Aſiatic Turkey, in the province of Natolia; 20 miles N. of Sinob.

ISTENAZ, a town of Aſiatic Turkey, in the province of Caramania; 18 miles W. of Satalia.

ISTEPEC, a town of Mexico, in the province of Guatimala; 12 miles N. of St. Salvador.

ISTER, in *Ancient Geography*, the name which the Greeks gave to the river which we call the *Danube;* which ſee.

ISTESSO, L'Isteſso, *Ital.* in *Muſic*, the ſame ſound, air, or interval. Domenico Scarlatti, in Roſcingrave's edition of his firſt book of Leſſons, has *l'iſteſſo differente* for the ſame air, varied; and Padre Martini, for exactly the ſame thing, has *ſteſſo*, *ſteſſiſſimo*.

ISTHÆVONES, or Istævones, in *Ancient Geography*, a people of Germany, who, according to Pliny (l. iv. c. 14.), were ſituated near the Rhine, and of whom the Cimbri, in the interior of the country, formed a part.

ISTHMIA, Ισθμια, or Isthmian *Games*, *Ludi Iſthmii*, were ſolemn ſports, being one of the four ſacred games celebrated in ancient Greece.

They were called *Iſthmian*, becauſe they were celebrated in the Corinthian iſthmus, a neck of land by which Peloponneſus is joined to the continent.

Plutarch, in the life of Theſeus, tells us they were inſtituted by that hero to the honour of Neptune, in imitation of Hercules, who had before inſtituted the Olympic games to the honour of Jupiter; but Archias refers their inſtitution to the honour of Melicertes, or Palæmon, ſon of Athamas, king of Thebes, whom the Latins call Portumnus. Others ſay they were inſtituted by Niſis, ſon of Neptune; and others, by Siſyphus, brother of Athamas, king of Corinth, about 1326 years B.C. Others are of opinion that there were two diſtinct ſolemnities obſerved in the Iſthmus, one in honour of Melicertes, and another in honour of Neptune.

The moſt probable account of the origin and ſubſequent renewal of theſe games, allowing, as it may perhaps be neceſſary, for ſome mixture of fable, is as follows: Athamas, king of the Orchomenians, a people of Bœotia, having divorced his former wife, named Nephele, by whom he had two ſons, Phryxus and Hellé, and having married Ino, by whom he had alſo two ſons, Learchus and Melicertes, or Melicerta; the latter perſecuted the children of the former marriage, ſo far as to make her huſband believe that the oracle of Delphos demanded the blood of Phryxus, as the means of putting a ſtop to the famine of which ſhe herſelf was the cauſe; and the too credulous Athamas was upon the point of ſacrificing his ſon to the ſafety of his ſubjects; but upon information of his wife's whole management, he ſlew her ſon Learchus, and purſued Ino with ſuch eagerneſs, that ſhe was found to throw herſelf down with Melicerta, whom ſhe held in her arms, from the top of the rock Moluria, into the ſea. A dolphin, we are told, or rather the waves, carried Melicerta into the iſthmus of Corinth; and the Corinthians, at the perſuaſion of Siſyphus, the brother of Athamas, after having given him a ſplendid funeral, inſtituted to his honour games, which obtained the name of Iſthmian, from the place where they were celebrated for the firſt time. Theſe games, in which were exhibited the ſame trials of ſkill as in the others, and chiefly thoſe of muſic and poetry (ſee Games), having been interrupted, probably by ſome wars, were afterwards re-eſtabliſhed by Theſeus (1234 B.C.), who conſecrated them to Neptune, whoſe ſon he pretended to be, as to the god who peculiarly preſided over the iſthmus of Corinth; and they were renewed ſo regularly every five years, about the middle of the month Hecatombion, that they were not even diſcontinued after the city of Corinth had been deſtroyed and reduced to aſhes by Mummius (146 B.C.); the Sicyonians having received orders to celebrate them, notwithſtanding the public grief and deſolation. When the city was afterwards rebuilt, the new inhabitants reſumed the care of theſe games, and continued to exhibit them with great regularity. Some time after, the Romans were admitted to them, and celebrated them with ſo much pomp and apparatus, that beſides the ordinary exerciſes, a hunting match was there exhibited, in which were preſented the moſt rare animals; the city of Corinth neglecting no means by which they might pleaſe their conquerors: and their fame was ſtill increaſed, becauſe they ſerved as an era to the Corinthians, and inhabitants of the iſthmus.

Archias and others ſay, the conqueror's prize at theſe games was a crown of parſley. Plutarch and Strabo ſay it was at firſt a crown of pine; and that this was afterwards changed for one of parſley; but that at length the pine was reſumed; and to this was added a reward of 100 ſilver drachmæ, or about 3*l.* 4*s.* 7*d.* ſterling.

Theſe games were held, according to Pindar, every three years, or, according to Pliny, every five; and were ſo celebrated, and the concourſe at them was ſo great, that only the prime perſons of the moſt remarkable cities could have places in them. The Athenians had only as much room allotted them as the ſail of a ſhip, which they ſent yearly to Delos, could cover.

ISTHMUS, Ισθμος, in *Geography*, a narrow neck, or ſlip of ground, which joins two continents; or joins a peninſula to the terra firma, and ſeparates two ſeas.

The moſt celebrated iſthmuſes are that of Panama or Darien, which joins North and South America; that of Suez, which connects Aſia and Africa; that of Corinth, or Peloponneſus, in the Morea; that of Crim-Tartary, otherwiſe called Taurica Cherſoneſus; that of the peninſula Romania and Eriſſo, or the iſthmus of the Thracian Cherſoneſus, twelve furlongs broad, being that which Xerxes undertook to cut through. The ancients had ſeveral deſigns of cutting the iſthmus of Corinth, which is a rocky hillock, about ten miles over; but they were all vain, the invention of ſluices not being then known. There have been attempts, too, for cutting the iſthmus of Suez, to make a communication between the Red ſea and the Mediterranean.

Isthmus is alſo applied, by the anatomiſts, to ſeveral parts of the human body, particularly that narrow part of the throat, ſituate betwixt the two tonſils.

Alſo to the ridge that ſeparates the two noſtrils; and to the paſſage in that part of the medulla oblongata of the brain which lies between the cerebrum and cerebellum, and which reaches from the place called *anus* to the fourth ventricle. The upper part or cover of this conduit, or paſſage, which is betwixt the teſtes and the foremoſt vermicular proceſs of the cerebellum, and to which two it is tied at its two ends, and to the proceſſes which come from the cerebellum to the teſtes at its ſides, is called *valenta major;* it is of a medullary ſubſtance, and its uſe is to keep the lympha from falling out above the nerves in the baſis of the ſkull.

ISTIATZKA, in *Geography*, a town of Ruſſia, in the government of Tobolſk, on the Vagai; 68 miles S. of Tobolſk.

ISTIÆ, in *Ancient Geography*, a town of the iſland of Eubœa; ſituated in the northern part of the iſland upon a mountain, nearly oppoſite to the Pelaſgic gulf, which belonged to Theſſaly. It was anciently called Oreos, from its ſituation, ορος being a mountain. Its original inhabitants were driven from it by Pericles, and retired to the Eſtiotide, an interior country of Theſſaly; and their place was occupied by a colony of Athenians, of the tribe Heſtiæa. It is now called Orio, or Oreo.

ISTIB, in *Geography*, a town of European Turkey, in Macedonia; 72 miles N. of Saloniki. N. lat. 41° 50′. E. long. 22° 48′.

ISTILLAR, a town of European Turkey, in Macedonia; 56 miles S.E. of Saloniki.

ISTIZER, a town of Ruſſia, in the government of Tobolſk; 24 miles E.S.E. of Tobolſk.

ISTLAN, a town of Mexico, in the province of Mechoacan; 60 miles N.W. of Mechoacan.

ISTRE, a town of France, in the department of the mouths of the Rhone, and chief place of a canton, in the diſtrict of Aix; 18 miles S.E. of Arles. The place contains 2111, and the canton 5932 inhabitants, on a territory of 347½ kiliometres, in 4 communes.

ISTRIA, a peninſula of Europe, bounded every where by the ſea, except on the north, where it is joined to Carniola. This peninſula was anciently a part of Illyrium; but being conquered by the Romans, between the firſt and ſecond Punic wars, it was annexed to Italy. In the middle ages it belonged to the patriarch of Aquileia, who was inveſted with it, as a marquiſate, by the emperor Henry IV. In the year 1190 the maritime part was for the moſt part conquered by the republic of Venice, abating ſome interruptions on the part of the Auſtrians. Venetian Iſtria was divided into 4 biſhoprics and 18 diſtricts; it contained 6 large, and 12 ſmall towns, or boroughs, 200 villages, and 100,000 inhabitants, who were chiefly employed in agriculture, the production of wine and oil, the rearing of bees, the manufacture of ſilk, leather, tallow, and ſalt, and fiſhing. The grain, wine, oil, and ſalt, have been reckoned excellent, and have afforded, together with the tunny fiſh and anchovy fiſhery, profitable articles of commerce. The marble and ſtone have likewiſe ſupplied important branches of trade. But the chief wealth of Iſtria has conſiſted in its foreſts, which overſpread a great part of the country, and yield abundance, not only of fire-wood and timber for ſhip-building, but alſo of game. By the treaty of Campo Formio, in 1797, and that of Luneville, in 1801, the Venetian part of Iſtria was ceded to Auſtria. But by the treaty of Preſburg, in 1805, that part of the ſtates of the republic of Venice, which had been ceded to the emperor of Germany and Auſtria by the treaties of Campo Formio and Luneville, were united in perpetuity to the king of Italy.

ISTRUP, or Oistrup, a town of the biſhopric of Paderborn; 12 miles E. of Paderborn.

ISTUNALA, a town of South America, in the government of Tucuman; 130 miles E. of St. Miguel de Tucuman.

ISUNGO, a town near the centre of the iſland of Gilolo.

ISVORA, a town of Walachia; 12 miles E.S.E. of Brancovina.

ISURIUM, in *Ancient Geography*, a town of the iſland of Albion, or Britain, in the country of the Brigantes. It is now Aldburrow, near Boroughbridge, and probably derived its name from its ſituation on the river Ure. Although it is now a ſmall village, it ſeems to have been once the capital, of the Brigantes; being called, both in the Itinerary of Antonine and in Ravenna's, "Iſurium Brigantum." The foundations of the ramparts may ſtill be traced.

ISWARA, in *Hindoo Mythology*, one of the many names of Siva; but it is ſometimes applied, rather confuſedly, to other deities, being nearly equivalent to our lord, and ſuſceptible of equivocal application. Generally, however, it is underſtood of Siva, and ſometimes has the epithet *Maha* prefixed, giving Mäheſwàra, or the great Iſwàra. Under this form the name of his ſakti, or conſort, is Mäheſwàri.

ISWETOSTA, in *Geography*, a town of Sweden, in the province of Skonen; 8 miles N.E. of Chriſtianſtatt.

ITABIER, a town of the iſland of Borneo; 30 miles N. of Negara.

ITABOCA, a town of Brazil, in the government of Para, on the Tocantin; 90 miles S. of Canuta.

ITACAMBIM, a town of Brazil; 60 miles N. of Villa Nova del Principe.

ITACORUSSA, a town of Brazil, ſituated on the Xingis; 60 miles S.W. of Curupa.

ITAIARA, in *Ichthyology*, a name by which ſome have called a Braſilian fiſh, of the turdus kind, of great beauty, and a very delicate taſte, more uſually known by the name *juruncapeba*.

ITAKA, in *Geography*, a town of Japan, in the iſland of Niphon; 35 miles S. of Ixo.

ITALA, a town of Sicily, in the valley of Demona; 13 miles S.W. of Meſſina.

ITALAH, a town of Aſiatic Turkey, in Natolia. N. lat. 38° 43′. E. long. 28° 29′.

ITALIA, in *Ancient Geography*. See Italy.

ITALIAN, the language ſpoken in Italy.

This tongue is derived principally from the Latin, and of all the languages formed from the Latin, there is none which carries with it more viſible marks of its original than the Italian.

It is accounted one of the moſt perfect among the modern tongues. It is complained, indeed, that it has too many diminutives and ſuperlatives, or rather augmentatives; but without any great reaſon: for if thoſe words convey nothing farther to the mind than the juſt ideas of things, they are no more faulty than our pleonaſms and hyperboles.

The language correſponds to the genius of the people; they are ſlow and thoughtful; and, accordingly, their language runs heavily, though ſmoothly; and many of their words are lengthened out to a great degree. They have a great taſte for muſic; and to gratify their paſſion this way, have altered abundance of their primitive words; leaving out conſonants, taking in vowels, ſoftening and lengthening out their terminations for the ſake of the cadence.

Hence the language is rendered extremely muſical, and ſucceeds better than any other in operas, and ſome parts of poetry; but it fails in ſtrength and nervouſneſs: hence alſo a great part of its words, borrowed from the Latin, become ſo far diſguiſed, that they are not eaſily known again.

The multitude of ſovereign ſtates into which Italy is divided, has given riſe to a great number of different dialects in that language; which, however, are all good in the place where they are uſed. The Tuſcan is uſually preferred to the other dialects, and the Roman pronunciation to that of the other cities; whence the Italian proverb, "Lingua Toſcana in bocca Romana."

The Italian is generally pretty well underſtood throughout Europe, and is frequently ſpoken in Germany, Poland, and Hungary. At Conſtantinople, in Greece, and in the ports of the Levant, the Italian is uſed as commonly as the language of the country; indeed in thoſe places it is not ſpoken ſo pure as in Tuſcany, but is corrupted with many of the proper words and idioms of the place; whence it takes a new name and is called *Frank* Italian. See LANGUAGE.

ITALIAN *Coins, Meaſures, Marble, Silks.* See the ſubſtantives.

ITALIAN *School of Engraving.* Engraving, with the work of the ſcorper occaſionally intermingled with that of the graver, had been practiſed in Italy, from time immemorial, in oramenting thoſe golden and ſilver vaſes, ſalvers, chalices, and other veſſels of plate, which adorned the communion-tables of the Catholic church, and the ſide-boards of the noble and opulent, when, about the middle of the fifteenth century, Maſo, or Thomaſo, Finiguerra, a goldſmith of Florence, accidentally diſcovered the means of printing from the inciſions thus ſculptured on the metal: ſo that engraving on copper-plates, as it is now practiſed, with the view of rendering impreſſions on paper, is a ſcion from the decorative part of the art or trade of the goldſmith; but which has gradually far out-grown the parent tree.

Vaſari, in his biography of Marc Antonio, has, with great propriety, connected his account of that diſtinguiſhed engraver, with an hiſtory of the diſcovery which rendered his art ſo famous and ſo extenſively beneficial. He ſays that Finiguerra, having performed an engraving on a piece of plate, and intending to fill up the hollows with enamel; in order to try the effect of it previouſly to putting on the enamel, caſt ſome melted ſulphur upon it, and, on taking it off, perceived that the dirt (or charcoal with which he firſt tried his work) collected at the bottom of the ſtrokes, by adhering to the ſulphur, gave an impreſſion of what he had engraven. Struck with the diſcovery, he repeated the experiment, by applying moiſtened paper to his engraving inſtead of ſulphur, rolling it gently with a roller, and this experiment being attended with ſucceſs, he imparted his diſcovery to Baccio Baldini, who was alſo of Florence, by whom it was communicated to Sandro Boticelli, and perhaps alſo Antonio Pollajuolo, and Andrea Mantegna.

The baron Heinnekin, however, believes that rolling-preſs printing had previous exiſtence in Germany, and ſubſequent writers (among whom is our countryman Strutt), giving credit to the opinion of an author, who is ſo generally worthy of it as Heinnekin, have copied this belief, or repeated this aſſertion of the baron, perhaps with too little reflection.

An accidental diſcovery of this kind, which might have taken place in any country where paper was known and uſed, reflects ſo little real honour upon its birth-place, as to be unworthy of half the importance which has been induſtriouſly endeavoured to be attached to it; yet for this trivial or fancied honour, the connoiſſeurs and literati of Italy and Germany have contended; and we muſt allow, that the mind of Heinnekin appears, in this inſtance, to have been influenced by an evident bias in favour of the pretenſions of his country.

He oppoſes, however, only conjecture to the plain and ſimple fact of Vaſari, which we have related above; and though he, as well as others, have ſeduloully ſought for evidence in the dates of the earlieſt German engravings, no ſuch evidence has been found. No German print impreſſed from an engraved plate, of which the date has not been ſubſequently altered to impoſe on the credulous, has been, or can be produced, as the preſent writer believes, bearing an earlier date than 1460, the year in which, according to Vaſari, the accident happened in the workſhop of Finiguerra, which gave to Europe the means of printing from the inciſion of the graver.

Finiguerra was born at Florence ſome time about the year 1434, and died in the ſame city at an advanced age. He is reported to have ſtudied under Maſſaccio. Probably he learned drawing in the ſchool of that maſter: and Baccio Bandinelli, in one of his letters ſays, that Maſo worked with Pollajuolo and other contemporary artiſts, on the far famed metal doors of the church of St. John at Florence. About the year 1450, he engraved alſo for the church of St. John, the Paſſion of Chriſt on a ſacred vaſe of gold, in a very artiſt-like manner, though the figures were ſmall. This fact is reported in a letter from M. Gabuori to Mariette; but of his other engravings we are compelled to ſpeak with doubt.

Whether any *impreſſions* from the works of this artiſt remain to atteſt his diſcovery of printing, and corroborate the ſtatement of Vaſari, is at the beſt uncertain. Strutt has mentioned dubiouſly, "The Seven Planets;" which are really from the graver of Boticelli, and with better ſhow of reaſon, a ſmall plate of an artiſt engaged in his profeſſion, which is marked with the letter F on a ſtone, and is certainly in the very earlieſt ſtyle (for Baldini and Boticelli can ſcarcely be ſaid to have attained a ſtyle) of Italian engraving; to which the foreign writers on art have added the twenty-four following ſmall engravings, which are, for the moſt part, of the circular form. According to Huber and Roſt they were recognized as the work of Finiguerra by M. Otto, a well-known amateur of Leipſic, by M. l'Abbe Zani of Parma, and by the more celebrated baron de Stoſch, the latter of whom reſided a long time at Florence, whilſt he was forming his immenſe collection of works of art. All of theſe connoiſſeurs have admitted them into their collections as the work of Finiguerra; and Heinnekin, after attentive examination, has adjudged them to be his engraving and printing.

1. A couchant female, perhaps intended for a Venus. On a ſtreamer ſurmounting the couch, is inſcribed "Amor vuol fé, o dove fé nonne." 2. The male and female ſupporters (a young man and woman) of the arms of the Medicis, with a vaſe of flowers, &c. The female is dreſſed in the Grecian taſte, and holds two girdles. N. B. This ſeems to have been printed from the cover of a round box. 3. A half-length figure of a young man with a parroquet on his ſhoulder, playing the guitar, encircled by a border of fruit. 4. An adoleſcent cupid tied to a tree, his eyes

bandaged, and four females tormenting him. 5. The ſame ſubject, differently treated. 6. Eight ſmall ovals encloſed in a circular border of foliage. In the middle are two profiles of character, and in each of the reſt a little cupid playing on ſome muſical inſtrument. 7. A ſimilar ſubject, except that in a circle in the middle, a cavalier and lady are repreſented dancing. 8. Another circle bordered with fruit. In the middle part, a bear in a landſcape is attacked by five dogs, and at the top are two cartouches, on the ſcrolls of which the arms of the Medicis are traced with pen and ink. 9. Another circle, bordered with foliage. The ſubject a muſical party, conſiſting of a cavalier and two ladies in a garden. 10. A monſtrous viſage, the mouth of which is extended by two hands, in a circular border. 11. Contains two profiles en medallion bordered with laurel; above them are three hunting ſubjects, in one of which a dog is attacking a ſtag, whilſt a hare is eſcaping. 12. A lady careſſing a unicorn. A dog is at her feet, and her head enwreathed with flowers. 13. Judith and Holofernes, in which the heroine is habited in the antique taſte. 14. The ſame ſubject, except that Judith is here more richly dreſſed than in the former, and crowned. 15. A cavalier and lady walking in a cypreſs grove, whilſt a youth plays the tamboureen. 16. Jaſon and Medea, who appear as ſupporters to an armorial bearing. 17. Two ſupporters to a ſphere: one of whom (the man) holds a ſtreamer, on which is written "Amor vuol fé, a dove fé nonne;" the other is a female dreſſed in the antique taſte, and holding the motto "Amor non pico." 18. Another heraldic ſubject, in the midſt of which a circular ſpace is left blank for an armorial bearing. The left ſupporter is a young lady, and on the right hand is a cavalier holding a wreath of laurel; a winged cupid is fluttering above, and beneath, a dog is aſleep. 19. Another circular armorial bearing, with a male and a female ſupporter. 20. A guardian angel, with expanded wings in a pontifical habit. 21. Cupids holding wreaths of flowers and fruit; one with his eyes bandaged. 22. Bacchanals; in the midſt of which is a car drawn by cupids, ſurmounted by a trophy of gabions throwing out fire. Some of the cupids are playing on inſtruments of muſic, others bearing flambeaus. The proceſſion is led by one carrying a flag, on which is written "Purita," and cloſed by another, whoſe motto is "Al fecogedit." 23. Two women elegantly attired, ſitting in a landſcape, ſupporting a border of cornucopias. 24. Two warriors, with each a knee on the ground, ſupporting an octagonal eſcutcheon, on which is a female with her hands raiſed towards heaven. N. B. The four latter are ovals.

"An edition of the "Inferno of Dante," printed at Florence in the year 1481, has long been ſuppoſed to contain the earlieſt Italian engravings, excepting the maps to an edition of Ptolemy printed at Rome in 1478, of which the *date* is aſcertained, and to have been the firſt book ever embelliſhed with copper-plate prints, in which human figures, or other natural objects, were attempted to be repreſented. This is, however, a miſtake. The extenſive and well choſen bibliographical collection of earl Spencer contains a more perfect book, printed alſo at Florence, (by Niccolo Lorenzo della Magna,) but in the year 1477, which is four years anterior to the "Dante." Its title is "Monte Santo di Dio;" its author Antonio Bettini, biſhop of Fuligno; and of the three engravings it contains, one is much larger than the embelliſhments of Dante.

"The prints that accompany both theſe books are the joint performance of Baccio Baldini and Aleſandro Boticello, or Boticelli; and none of them diſcover much ſkill either in the deſign or execution. The ſame artiſts have alſo engraven a ſet of the Prophets, ſingle figures; and a much larger plate than had yet appeared in Italy, of which the ſubject is "The Laſt Judgment," and where the damned are repreſented in ſeparate places of torment, which reſemble ovens, each inſcribed with a particular vice or mortal ſin. But it muſt be added, that all the engravings which theſe artiſts performed in conjunction, are Gothic, vulgar, and inferior to thoſe of their German contemporaries."

Baldini was a Florentine by birth, and was brought up to the buſineſs of a goldſmith. Judging from his engraving, and his obſcurity in every other reſpect, he ſeems to have been one of thoſe men of ſlender talent, who are pretty numerous in all times and places; whoſe mere want of employment affords them leiſure to catch at, and avail themſelves of the advantages of, the inventions and diſcoveries of others. From Finiguerra he obtained his method of printing; and Boticelli furniſhing him with deſigns, he engraved, with the help of the latter, nineteen plates for the above-mentioned edition of the "Inferno of Dante." The whole of his other engravings, with which we are acquainted, have been already mentioned.

Sandro Boticelli, ſurnamed Filipipi, goldſmith, painter, deſigner, and engraver, was born at Florence in the year 1437, and died in the ſame city in 1515. Though apprenticed to a goldſmith, he ſtudied the art under Filippo Lippi the painter, and acquired ſome reputation by his pictures, but more by his drawings. His biographers ſay, that he learned engraving (probably printing by means of the roller) of Finiguerra; and beſide the deſigns for Dante's poem, and thoſe which follow, Vaſari mentions with diſtinction, as his very beſt performance with the graver, a print, entitled "Le Triomphe de la Foi de Fra Girolamo Savanarola."

"St. Jerome on his Knees, extending his right Hand toward a Crucifix;" "St. Sebaſtian with the Virgin Mary," inſcribed "O Mater Dei, memento mei.—O beate Zebaſtiano;" a ſet of twelve of "The Sybils," with each a ſcroll, and eight Italian verſes beneath; "The ſeven Planets." (N.B. It is one of them, namely, the planet Venus, which Strutt has copied, and aſcribed to Finiguerra.) "The Triumph of Paulus Emilius," inſcribed on a medallion, "Paulo Emilio Aug.;" a ſet of the "Vices" and "Paſſions," with "Innocence" and "Truth;" "The glorified Saviour riſing in Judgment, attended by the Prophets and Saints." The three latter are of ſmall folio dimenſions; and of the laſt of all we have already particularly ſpoken under the title of "The Laſt Judgment," the joint production of Boticelli and Baldini.

"Antonio Pollajuolo or Pollajuoli, who was alſo of Florence, and born ſome time about the year 1426, may with more propriety be called an artiſt. From the antique ſculpture, which was now beginning to re-appear, he ſeems to have learned attention to the anatomy of his figures: to which moſt important requiſite of hiſtorical art, Pollajuolo has the diſtinguiſhed honour of having been the firſt to attract critical attention. He has ſhewn his predilection for this ſtudy, by repreſenting the conſpirators naked in the medal which he cut to commemorate the aſſaſſination of Juliano, and the attack on Lorenzo de Medici; and alſo in a much larger engraving than had hitherto been executed, of which the ſubject is a battle, and wherein he has repreſented all the combatants naked. There is an impreſſion of this very ſcarce print in the Cracherodean collection, printed on reddiſh paper: each figure is nearly eleven inches in height; the heads have ſome faint dawnings of expreſſion; and the ſhadows are produced without croſſings, by diagonal lines, apparently done to imitate the hatchings of a pen, and in the ſame direction in which it is cuſtomary to write: but the outlines and ſhadows are dry and hard, and the forms vulgar and heavy. It is only by comparing Pollajuolo with his contemporaries and predeceſſors, that we learn to reſpect his performances; and it has even been ſaid of his moſt celebrated work, (“The Martyrdom of St. Sebaſtian,”) that it “exhibits only a group of half naked and vulgar wretches diſcharging their arrows at a miſerable fellow-creature, who, by changing places with one of his murderers, might with equal propriety become a murderer himſelf:” ſo little attention was paid even in Italy, at this early period, to character and expreſſion.” Landſeer's Lectures.

Like moſt of the contemporary artiſts of his country, Pollajuoli practiſed occaſionally the ſeveral branches of imitative art, which have ſince become diſtinct profeſſions, and was at once goldſmith, medalliſt, ſculptor in relievo, painter, and engraver with the burin. Bartolucci was his principal, or at leaſt his firſt inſtructor; but he worked with conſiderable credit, under Ghiberti, on the juſtly celebrated metal doors of the church of St. John at Florence. He alſo executed the monument of pope Sixtus IV., which originally ſtood in the chapel of that name, and has ſince been removed by the order of Urban VIII. to the church of St. Peter; and that of Innocent VIII.; which are both in bronze, and are works of great merit. The plan of the Belvidere palace has been likewiſe attributed to him.

Of the prints now extant from the graver of Pollajuoli, we know only of the following:

The above-mentioned large folio, wherein ſix men are repreſented fighting with ſwords in a foreſt; an “Holy Family,” alſo in folio; and two ſmaller prints of “The Labours of Hercules,” in one of which he is engaged with Antæus, and in the other removing a column.

An obſcure village near Mantua gave birth to the chevalier Andrea Mantegna, in the year 1451. Born in indigence, he was obliged in his early youth to tend ſheep for a ſubſiſtence; but being gifted by nature with a happy genius for the imitative arts, he employed all his leiſure in endeavouring to draw the objects around him. F. Squarcione, that obſervant protector of the fine arts, who was thence ſurnamed the Father of Painters, diſcovering the diſpoſition of our young ſhepherd for painting, took charge of his education; and conceiving for him an ardent affection, which increaſed with the increaſing merit of Mantegna, finally created him heir to his fortune.

Mantegna married the daughter of John Bellino of Venice. Correggio became his diſciple, and the duke of Mantua his warm admirer and patron: from his hands our artiſt received the honour of knighthood; and for him he painted that celebrated picture, which he afterwards engraved, and which is now in the royal palace at Hampton-Court, of the “Triumph of Julius Cæſar.”

He executed ſeveral great works for pope Innocent VIII., who invited him for that purpoſe to Rome. He painted an altar-piece for the church of St. Sophia of Padua; and ſeveral pictures for that of St. Juſtinian, particularly one which has been much admired for its colouring as well as deſign, in a chapel belonging to that church: finally, he died in the ſame city (of Padua), highly honoured and admired, in the year 1517; and a tomb, ſurmounted by his buſt, was raiſed to his memory in the church of St. Andrew.

Mantegna contributed much to the advancement of Italian engraving. “By his more intimate knowledge of the antique, and his ſuperior uſe of that knowledge, he improved the drawing, without materially altering the ſtyle of engraving of Pollajuolo, by whom he is preſumed to have been inſtructed in the new art. Indeed, as the local energies and practical perfections of painting were at this time ſo imperfectly developed, it was much more natural, and in the ſame degree more wiſe, for engraving to imitate pen and ink drawings than to imitate pictures; and the beſt of Mantegna's prints derive a peculiarity of character and of value from this circumſtance. By intermingling the appearance of the finer ſtrokes of the pen, as it worked upward, in his ſhadows he ſoftened and mellowed the ſtronger lines; ſo that the whole became a more appropriate vehicle of the obſcurity he had in view: and the exact ſimilarity of his ſtyle of engraving to his own mode of drawing ſufficiently ſhews, that to imitate pen and ink drawings was the boundary of his aim.

“A very curious pen and ink drawing from the hand of Mantegna, of which the ſubject is an attempt to reſtore an allegorical picture which Apelles painted from an event in his own life, is now in the poſſeſſion of Mr. Weſt, preſident of the Royal Academy. He engraved, from his own deſigns, ſometimes on copper, and ſometimes, as it is ſaid, upon tin. “In his engravings, as in his pictures, his contours are of a grand and decided character, ſuſtained throughout by much of what has ſince been termed the noble ſimplicity of the Roman ſchool. His prints are not few; but conſidering the early period at which they were performed, are much more extraordinary than numerous. The two “Labours of Hercules,” in the Cracherodian Collection, ought probably to be reckoned among the earlieſt of Mantegna's engravings. Like thoſe of Pollajuoli, they are printed on reddiſh paper, and are deſigned in the ſame heavy ſtyle. His “Bacchanalian Proceſſion” has ſtill ſome conſiderable remains of Gothic groſſneſs; but he has here ſhewn his talent in compoſition, and the fore-ſhortenings that occur are far better expreſſed than we have hitherto ſeen. The compoſition of his “Battle of Sea-Gods and Tritons” is wildly grand, with ſuch a mixture of the groteſque, as may ſeem not improperly to belong to a ſubject which we ſhould eſteem out of nature, or beyond the limits of the material world. The combatants in this battle are the offspring of his own fertile and vigorous fancy, generated by the ſculpture of antiquity. Beſide the tritons and ſea-monſters, here are the general forms of horſes and men; but, like the fawns and ſylvan deities of the Greeks, their natures partake of the element in which they exiſt:—at leaſt, the ſpectator is led to perceive that this intention exiſted in the mind of the artiſt, and that (in the words of Ariel's ſong) they have undergone “a ſea-change, into ſomething rich and ſtrange.” Inſtead of hair, ſea-weed decorates the human heads; and the fins and ſcales of marine animals help to conſtitute the horſes and tritons. Their weapons, too, are congenial with themſelves: they fight with fiſh and fiſh-bones, and the ſkull of ſome unknown inhabitant of the deep ſerves as a ſhield.

“The heads of the horſes, as well as thoſe of the ſea-gods, are animated by no inconſiderable portion of the ideal grandeur of the antique; the anatomical markings, the conſtant object of Mantegna's attention, are alſo ſucceſsfully ſtudied from the ſame ineſtimable ſource of information: and in the early impreſſions, the chiaroſcuro has more breadth, as well as depth, than ſeems to belong to the Italian art of this early period, and is conducted through the whole with maſterly addreſs.

“A more ſlow and ſedate magnificence moves his triumphal proceſſion of Julius Cæſar. The wild imagination which revels in his receſſes of the ocean, and his bacchanalian proceſſions, is nearly excluded from hence; it but ſerves, in the flaming of the candelabra, to gleam through “the ſpoils of nations, and the pomp of wars;” or faintly diſcovers itſelf in other ſubordinate acceſſories as the fringed ornament of ſtately grandeur.

"In his Dance of females, he has ſhewn ſo much of the graceful ſimplicity and general air of Greek ſculpture, as to give riſe to a belief that it has been copied from an antique baſſo-relievo: but till ſuch a baſſo-relievo is ſhewn, it would be unfair in us to reſign ſo much of the merit of Andrea Mantegna as this compoſition may claim. Theſe three engravings abundantly demonſtrate the wide range of his technical and inventive powers; and ſhew with what ſucceſs he could combine, or ſeparately exhibit, elegance, wildneſs, and grandeur, as occaſion admitted or required.

"Some critics have thought that Mantegna's admiration of the antique was too predominant in his works; that it too frequently engroſſed his powers; and hurried him too entirely away from that contemplation of nature, which muſt always be one of the parents of originality in art. Yet, if this enthuſiaſm be a fault, it is a fault proceeding ſo neceſſarily, and ſo immediately, from the localities of time and place, and the redundance of his merits, that it is as ſecure of pardon from the candid, as thoſe merits are of praiſe." Landſeer's Lectures.

The monogram of this celebrated engraver, reſembling that of Marc Antonio, will be found in our *Plate* I. of thoſe of the *Italian School.* The following liſt is believed to contain all his principal works, and it is not certain that he engraved any more than this liſt contains. They are of folio dimenſions, and ſome of them very large:—"The Madonna and Infant Chriſt," (copied by Strutt in his Biographical Dictionary of Engravers); "The Choice of Hercules;" "Hercules overcoming Antæus," inſcribed "Divo Herculi invicto." "The Marriage of Eneas with Lavinia;" "The Scourging of Chriſt;" "The Entombing of Chriſt," inſcribed "Humani generis Redemptor;" "The Deſcent of the Saviour to Hell;" "The Reſurrection of Jeſus Chriſt;" "Judith with the Head of Holofernes;" and two groteſque monſters fighting in the preſence of two warriors.

The following are the principal ſubjects of M. Landſeer's comments which are quoted above:—"A Bacchanalian Proceſſion," in which both fawns and ſatyrs are introduced; "A Battle between various marine Monſters;" "A Dance of Four Females;" "The Triumph of Julius Cæſar," engraven on nine plates, which, when joined, form a magnificent frieze: but it is uncommon to find a collection where the nine are complete.

Giovanni Mariæ da Breſcia, or Brixienſis, was a native of Breſcia, in the Venetian territory, and was born A.D. 1460. He was an eccleſiaſtic of the order of Carmelites, and about the beginning of the ſixteenth century, painted "The Hiſtory of Eliſha and Elijah" for the monaſtery to which he belonged. He alſo practiſed goldſmithery; but it is his engravings, which are ſomewhat numerous, that are the proper ſubject of our preſent notice.

The ſtyle of his manual execution is not always alike. In ſome of his prints it is evidently formed on that of Andrea Mantegna, the lines which form the ſhadows being laid from one corner of the plate toward the other, without any croſs hatchings, ſomewhat neater than thoſe of his great exemplar, but very inferior to him in every other reſpect. On other occaſions he employed ſecond courſes of lines, but his drawing is heavy, and his extremities not well marked: yet his prints, of which the principal are entitled as follows, are much ſought after by the curious:—"The Virgin Mary ſeated on a Bench with a Book in her right Hand, holding the Infant Chriſt;" "The Virgin ſeated upon Clouds with the Infant Chriſt; St. John Baptiſt, St. Jerome, and three Carmelite Friars below," dated 1502; "The Miracle of St. Gregory reſtoring a Boy to Life." It is a large folio of thirteen inches by nine, and is inſcribed "Opus fris io Mariæ Brixienſis, or Carmelitarum MCCCCCII." The manual part of the engraving of this plate is in a mixed ſtyle between thoſe of Mantegna and Marc Antonio. "The Hiſtory of the Emperor Trajan," wherein the artiſt has complimented the reigning pope, by introducing him at a balcony above.

Giovanni Antonio da Breſcia, the brother of the preceding artiſt, was born at Breſcia ſome time about the year 1461, and alſo became a Carmelite friar. He applied more cloſely to engraving than Giovanni Mariæ, and ſtudied the works of Mantegna with ſomewhat better ſucceſs. Yet his outline is poor, though his manual execution is ſufficiently clear and neat. We have ſubjoined a liſt of his moſt eſteemed works, of which the beſt appear to be copies from Andrea Mantegna:—"Hercules vanquiſhing the Nemean Lion," after Andrea Mantegna, inſcribed "D. Herc in victo;" two plates of "Hercules" and "Antæus," after the ſame maſter, one of them an upright 4to.; "A White Horſe," reſembling that by Albert Durer, except in the back ground, a ſmall upright; "The Scourging of Chriſt," a large upright. Of theſe the earlieſt and beſt impreſſions are dated 1503, and a ſecond edition was printed in 1509. "The Virgin and Child;" "The Holy Family, with St. Joſeph aſleep;" two plates of a "Satyr and Female," inſcribed "Victoria Auguſta," on a tablet; "A naked Female repoſing with an Infant, while a Satyr is playing on a Pipe."

Hieronymus Mocetus, or Jerome Mocetto, engraved both on metal and on wood, and was born at Verona in the year 1454. Strutt's account of him is as follows:—"The prints by this ancient maſter are by no means common. He worked with the graver only; but did not excel in the management of that inſtrument. His ſtyle of engraving bears ſome reſemblance to that of Robella. Though it is conſiderably neater and clearer, he did not draw the naked parts of the human figure correctly. The extremities eſpecially are very defective. The ſtudy of the chiaroſcuro was at this time very little attended to. We muſt not wonder, therefore, at finding the works of this artiſt totally deſtitute of effect. However, they are not without merit; though, it muſt be confeſſed, that their ſcarcity ſtamps the greateſt value on them. We have by him, "The Reſurrection of Chriſt, with Four Soldiers at the Foot of the Tomb," apparently from his own deſign; "A Sacrifice," with many figures, from an antique bas-relief; a middling-ſized plate, lengthways. Alſo ſeveral battles, with other ſubjects; which are variouſly marked, as may be ſeen in our *Plate* I. of the monograms, &c. of the *Italian School of Engravers.*

Nicoletta, or Nicolas da Modena, was a native of Modena, and ſeems to have ſtudied architecture and perſpective with more aſſiduity than ſucceſs. He is ranked as one of the earlieſt engravers of the ſchool of Lombardy; and, when we examine his works, it ſeems as if the name of engraving only had reached him; and that he had been obliged to work out his own ſyſtem. It is aſtoniſhing, at a time when ſo many engravers of conſequence were living, and had produced ſuch a variety of excellent prints, eſpecially Marc Antonio and his ſcholars, that this man, who was himſelf a painter, ſhould have been ſo much at a loſs, not only in the mechanical part of the execution of his plates, but with reſpect to the compoſitions and drawing of them alſo. If theſe rude productions have any merit to recommend them, it muſt conſiſt in the buildings and architectural ornaments, which he introduced into his deſigns, and with which he has frequently crowded them in a very abſurd manner: he worked with the graver only; and his largeſt plates ſeldom exceeded the common folio ſize. He uſually ſigned his name at length; but, in ſome few inſtances, he uſed the two monograms which we have copied in our *Plate* I. of thoſe of the *Italian School*. We have engraven by him, “The Adoration of the Shepherds,” a middling-ſized upright plate, marked with his name at length; “St. Sebaſtian,” a middling-ſized upright plate, marked with his baptiſmal name; “Nicoleto,” on a tablet; another “St. Sebaſtian,” inſcribed with his monogram; “St. Jerome;” “St. George;” “St. Martin;” “A Triton embracing a Syren;” beſide other works of leſs repute.

Benedetto Montagna, was born at Venice ſome time about the year 1458, and died at Verona in 1530. He engraved on copper, and the graver was the ſole inſtrument of his art. His engravings are dated from a very early period of the art in Italy, and it is more than poſſible that the prints of Albert Durer, which were brought to Venice as an article both of taſte and commerce, and thoſe of Marc Antonio, who had now been following the profeſſion of engraving for ſome time in that city, might induce him to take up the novel art either as a matter of profit or of curioſity. The efforts of Montagna, however, are but feeble; his outline is exceedingly defective, and his manual execution harſh and rude, though in ſome few inſtances he attempted to aſſiſt the blending of his lights and half-tints by means of ſtippling.

Benedetto engraved from his own compoſitions; and the reſemblance which ſome of his prints bear to the earlieſt and rudeſt productions of Marc Antonio, of which we ſhall preſently ſpeak, may well be thought to ſtrengthen our ſuppoſition, that from them he learned the rudiments of the art. His engravings, of which the following will probably be found the beſt, are very rare, and are generally, if not in every inſtance, marked with his name at length:—“An Holy Family,” in which the Virgin Mary appears ſeated, holding the Infant Chriſt: St. John is ſtanding beſide her naked, and St. Joſeph appears below. A view of a town, with a river and bridge over it, conſtitutes the back ground: at the top is the artiſt’s name. “The Judgment of Midas,” a ſmall upright. A naked figure ſtanding by a tree, ſomewhat larger. An elderly man and a youth; the former playing on the bag-pipes, the latter upon the violin. A landſcape, with a hamlet in view, and an old man ſeated on a bank, both ſmall uprights. Another landſcape, with three women on the foreground. A young man ſitting on a rock, paſſing a cord round a palm tree. “The Rape of Europa.” “Venus chaſtiſing Cupid.”

Strutt ſays, that Rubetta, or H. Robetta, flouriſhed in 1610. This is evidently a miſtake. The French writers on art, with much more probability, ſay that he was born at Florence in the year 1460; but the events of his life are very obſcure, and his engravings of no value but from their antiquity and rarity, for they are wretchedly executed. The ſubjects of moſt of them are devotional, and he ſometimes affixed his name at length, and at others the initial letters R.B.T.A. on a little tablet.

His moſt eſteemed engravings are, “Adam and Eve,” a ſmall upright folio; “The Adoration of the Magi,” of a nearly ſquare form; “The Reſurrection of Jeſus Chriſt,” a ſmall upright folio; and “The Golden Age,” a large upright folio.

Titian alſo etched ſome plates about this time, probably in the way of recreation, and it is ſaid, performed ſome engravings on wood. Among the former are ſeveral large landſcapes from his own compoſitions, the ſubject of the moſt remarkable of which is a paſtoral, where a ſhepherd is playing on a flute, before his flock, by the ſide of a ſtream. In another a traveller is ſleeping by moonlight. He likewiſe etched an allegorical print of Death habited in the armour of a knight.

The moſt remarkable of his wood-cuts, if theſe are really by the hand of Titian, which appears very doubtful, are, “The Marriage of St. Catherine,” a large upright, executed in a ſlight but maſterly manner, and inſcribed “Titianus Vecellius Inventor Lineavit.” “The Triumph of Faith,” repreſented by a proceſſion of patriarchs, prophets, evangeliſts, apoſtles, ſaints, martyrs, preceding and following Jeſus Chriſt: it is compoſed of from eight to ten prints, forming, when paſted together, a very long frieze, and dated 1505. “The Deſtruction of Pharaoh and his Hoſt,” a very large print lengthways, compoſed of ſix parts. This is very rough and rudely cut, and by no means equal to the “Triumph of Faith,” which is a very maſterly performance. “Sampſon betrayed by Dalilah.” “The Deluge,” a larger engraving, printed on two ſheets, of which Papillon ſays, that it is very correct and admirable; but Strutt, (who had ſeen the print) very properly obſerves, that this boaſted preciſion ſeems to make againſt its being from the graver of Titian, who would ſcarcely have beſtowed ſo much time and labour as muſt have been required to compleat it in ſo neat and regular a manner.

The famous ſatirical engraving of an old ape and two young monkies, in the attitudes of Laocoon and his ſons, which was long aſcribed to Titian, is now known to be the performance of Nicolo Vicentino. It was done to ſatirize Baccio Bandinelli, who boaſted of having executed a Laocoon, which was ſuperior to the antique.

But Strutt thinks, and with great appearance of probability, that moſt, if not all of the wood engravings aſcribed to Titian, are really the work of his younger brother Ceſare Vecelli, who alſo produced a ſet of 8vo. prints, executed in a very ſpirited and maſterly ſtyle, from the deſigns of Titian, of ancient and modern dreſſes, which was publiſhed at Venice in 1590; but perhaps there had been a former edition. The title of the edition of 1590 runs thus, “Degli Habite Antichi et Moderni di diverſe parte del mondo, Libri due fatti da Ceſare Vecellio;” and in a ſubſequent edition, publiſhed in 1664, it is more fully expreſſed as follows: “Raccolta di figure delineate dal gran Titiano, e da Ceſare Vecellio ſuo Fratello deligentemente intagliate.”

A ſingle print in chiaroſcuro, ſerves to mark the talent, in that mode of engraving, of Baldaſſare Peruzzi, an extraordinary architect, painter, engraver, and antiquary of this period. He is generally ſuppoſed to have been a native of Sienna, but Vaſari ſays, and probably with truth, that he was born at Volterra, in the year 1481. Beſide building churches and palaces at Sienna, and other parts of Italy, he embelliſhed them with his pictures; and wrote a treatiſe on the antiquities of Rome. He left behind him a commentary on Vitruvius, which Papillon informs us he intended, but that the hand of death prevented him, to have illuſtrated with engravings on wood. It is reported, but we cannot ſay on what foundation, that he was poiſoned by ſome artiſt who envied his ſuperior talents.

The print to which we have alluded is an upright folio, repreſenting Apollo, Minerva, and the Muſes, with Hercules expelling Avarice from their preſence. It appears to be engraven on three blocks; one for the outlines, another for the half-tint, and a third for the deeper ſhadows. It is executed in a bold and ſpirited ſtyle, and inſcribed “Bal. Sen,” over which letters is a five-pointed ſtar.

Domenico Campagnola was born at Padua A.D. 1482. He was the ſon of Jerome Campagnola, the ſculptor, and the diſciple of Titian. He chiefly excelled in landſcape, and has produced a conſiderable number of prints, ſome of which are etchings and others engravings on wood, executed in a bold ſtyle, but very ſlight, and incorrect in his drawing of the naked. He died at Venice in the year 1550, but lies interred in the church of St. Anthony of Padua, near the tombs of his anceſtors.

Of his etchings the following are the principal:—“The Adoration of the Magi and Kings,” a grand compoſition, in folio; “Cæſar's Tribute Money;” “Our Saviour healing the Sick;” “The Parable of Dives and Lazarus,” in large folio, etched on three plates, and marked “D.C. In Luca Bertelli,” &c.; “The Gift of Languages, or Deſcent of the Holy Ghoſt,” a large circle, inſcribed “$\frac{\text{D O}}{\text{CAP}}$ 1515;” “The Holy Family, with St. Jerome and St. John,” after Titian, a large folio, dated 1517. Two circular prints, one of which is “The Decollation of a Female Martyr;” “A Group of Warriors, attended by Fortune, ſtopping the Progreſs of the Arts and Sciences.” A landſcape, with Jupiter and Caliſto, after Titian. Another landſcape, on the fore-ground of which is a chariot drawn by two bulls; marked D. C.; a bacchanalian ſubject; a Venus, inſcribed “D.O. Camp. 1517.”

The moſt eſteemed of his letter-preſs engravings are “The Holy Family,” in a landſcape, with St. John and other ſaints. The Virgin Mother is repreſented ſuckling the Infant Chriſt; a folio print. A grand landſcape, in which is introduced St. Jerome. Another large landſcape, with a ſoldier and his family. Three children near a pedeſtal, one of whom is contemplating a dog gnawing a bone. “The Maſſacre of the Innocents;” and “The Deſtruction of Pharaoh and his Hoſt,” a large and grand work engraved on twelve blocks after Titian, and marked “Domenico del Greeche 1549.”

According to the teſtimony of the author of the Abecedario, Julio Campagnola, ſurnamed Antenoreus, was the brother of Domenico; Florent le Comte ſays, that he flouriſhed, as an engraver, from 1507 to 1517. He worked entirely with the graver, but in two very different ſtyles, one of which was his own invention.

The only two prints by Julio, with which we are acquainted, exemplify this remarkable variation in his ſtyle. The firſt is a ſmall upright of “The Rape of Ganymede;” the execution of which reſembles, in the manual, that of Marc Antonio, though the drawing is very inferior. It is inſcribed “Julio Campagnola Antenoreus fec.;” the other is ſomewhat larger, and repreſents St. John ſtanding, holding a cup and looking upwards. In this plate he has entirely departed from his former manner. The back ground is executed with round dots, made apparently with a dry point. The figure is outlined with a ſtroke deeply engraven, and finiſhed with dots, in a manner ſomewhat reſembling thoſe prints which Demarteau engraved at Paris, in imitation of red chalk. The hair and beard are expreſſed by ſtrokes. It is a very extraordinary print, and proves the antiquity of that mode of engraving, which has been erroneouſly conſidered as a modern invention; but its merit conſiſts chiefly in its ſingularity; for the drawing of the figure is ſtiff and incorrect, and there is nothing in the general effect to recommend it.

About the time now under our conſideration, there alſo aroſe in Europe another new mode of engraving, which ſucceſsfully imitated drawings waſhed with biſtre, or thoſe ancient Greek pictures which were called monochroms by the ancients. Mr. Landſeer ſays, that “the title of engraving in *chiaroſcuro*, was at that time excluſively, and therefore improperly applied to this new mode of art,” ſince chiaroſcuro, or effect of light and ſhade, is a neceſſary and elementary part of every mode of engraving that goes beyond a mere outline.

The invention of prints in *chiaroſcuro* is claimed both by the Germans and Italians. The latter aſſert that ſoon after the commencement of the ſixteenth century, Ugo da Carpi, a man of great ingenuity, diſcovered a mode of imitating ſlight drawings by the means of different blocks of wood. The Germans, on the other hand, produce ſeveral engravings by Mair, which are dated 1499, and one by Lucas Cranach, dated 1500, which are prior to the time affixed by the Italians for the invention by Da Carpi. This circumſtance, even if we ſhould ſuppoſe that the prints by Mair are the firſt attempts in this ſtyle of engraving, is ſufficient to prove the priority of the exerciſe of it in Germany. Baron Heinnekin is of opinion that the chiaroſcuros of John Ulric are ſtill more ancient than thoſe by Mair.

There is, however, a material difference between the chiaroſcuros of the old German maſters, and thoſe of the Italians. Mair and Cranach engraved the outlines and deep ſhadows upon the copper. The impreſſion taken in this ſtate was tinted over by the means of a ſingle block of wood, with thoſe parts hollowed out which were deſigned to be left quite white upon the print. On the contrary, the mode of engraving adopted by Ugo da Carpi, was to cut the outlines on one block of wood; the dark ſhadows upon a ſecond; and the light ſhadows, or half tint, upon a third. The firſt being impreſſed upon the paper, the outlines only appeared; this block being taken away, the ſecond was put in its place, their coincidence being ſecured by a mechanical contrivance, and being alſo impreſſed upon the paper, the dark ſhadows were added to the outlines, and the third block being put in the ſame place, upon the removal of the ſecond, and alſo impreſſed upon the ſame paper, made the demi-tints, and the print was completed. In ſome few inſtances, the number of blocks were increaſed, but the operation was ſtill the ſame, the print received an impreſſion from every block.

Da Carpi, who firſt practiſed this mode of art in Italy, was born at Rome in the year 1486. He ſtudied painting with his great contemporary Raphael, but appears to have poſſeſſed one of thoſe minds which, in all ages, bear hard upon rectitude, by preferring novelty to eſtabliſhed principle. He painted an altar piece for the church of St. Regard, in the execution of which he uſed no pencil, but laid on the colours immediately with his fingers; Michael Angelo being importuned for his opinion of this work, ſimply replied that “it would have been better had he uſed his pencils.”

It is probable that his paſſion for novelty led him to practiſe that new mode of engraving on wood, which is now under our notice, which alſo calling into action his acquired talents as an artiſt, enabled him to produce thoſe maſterly and ſpirited imitations of the ſketches of the great painters, from whoſe works they are taken, which he ſometimes printed in green, ſometimes in brown, and ſometimes in other colours, as his love of novelty and experiment directed.

Of theſe works, thoſe which are moſt ſought after by the curious, are as follow:—“A Sybil with Tablets and a Stylus, with an Infant Genius holding a Torch,” after Raphael, printed in green, and, according to Vaſari, the firſt work of the kind produced by Da Carpi. “Eneas eſcaping from Troy with his Father Anchiſes,” a large upright, from the ſame maſter. “The Deſcent from the Croſs,” an upright folio; “David beheading Goliah;” “The Slaughter of the Innocents;” “Jeſus preaching in the Temple;” “Elymas ſtricken with Blindneſs;” “The Death of Ananias;” “St. John in the Deſart;” “A Dead Chriſt on the Knees of his Mother;” and “Raphael converſing with his Miſtreſs;” are all after the works of this great painter.

After Parmegiano, he has engraven, a philoſopher ſeated, with a book open before him, and in the back ground, to the right, a bird, with its feathers plucked off; probably intended for Diogenes, and the cock which he plucked in ridicule of Plato's definition of man. This is a large and curious folio print, ſome of the impreſſions of which are printed in four different colours. “The Holy Virgin, with St. Sebaſtian, and St. Nicholas.” “A Satyr fathoming Water with his Flute.” All of theſe prints are of folio dimenſions.

Dominico Micarino of Sienna, ſurnamed Beccafumi, was born at Sienna, or in ſome neighbouring village, in the year 1484, and died in 1549 in the ſame city, which, by his various works in ſculpture, architecture, painting, and engraving, he greatly contributed to adorn. He was of poor parents, and like Andrea Mantegna, paſſed the early years of his life in keeping ſheep. His family name was Micarino; but ſignor Beccafumi, a diſcerning citizen of Sienna, obſerving him buſied in tracing forms upon the ſand with his crook, conceived a favourable opinion of his natural abilities, and raiſed him from obſcurity.

From this kind patron, who ſucceſſively placed our young artiſt under Antonio Vercelli, and Pietro Perugino, he took the name of Beccafumi. He travelled to Rome to compleat his ſtudies from the works of Raphael and Michael Angelo; after which he returned to Sienna, where he was employed in ſeveral works both in freſco and oil, which acquired him great applauſe, but nothing contributed more to the eſtabliſhment of his reputation than the Moſaic pavement with which he ornamented the cathedral of Sienna.

Micarino appears to have worked occaſionally in all the modes of engraving which had then been invented. He was a very good engraver on wood, and particularly excelled in chiaroſcuro, ſometimes working from his own deſigns, and at others from thoſe of Titian and other maſters. He alſo etched ſeveral plates in a very ſpirited ſtyle, and we have ſome few prints executed by him with the graver only. In theſe the hand of the maſter is very evident; the figures are drawn in a ſpirited ſtyle, and the extremities are finely marked, but, from want of ſkill in the management of the point and the graver, the mechanical part of the work has a harſh and unpleaſing appearance to an eye accuſtomed to neatneſs and preciſion.

His engravings, of which the following liſt ſpecifies the principal, are ſometimes marked with his name at length, and at others with the cypher which will be found in our *Plate* I. of thoſe of the *Italian School*.—A large folio print of “The Nativity,” after Titian, cut in wood in a very ſpirited manner. “The Holy Virgin embracing the Infant Chriſt,” printed in chiaroſcuro, in three colours, and probably from his own compoſition. Four prints executed in the ſame manner of “St. Peter,” “St. Philip,” “St. Andrew,” and “St. Jerome.” “A Philoſopher ſitting wrapt in his Mantle.” Portrait of pope Paul III. Three engravings on copper, of which the ſubjects are groups of academy figures; and ten engravings on wood of alchemical ſubjects.

The next engraver of decided talent that Italy produced was Marc Antonio Raimondi, whoſe name marks a memorable era in the hiſtory of engraving. He was born at Bologna in the year 1487 or 88, and died in the ſame city about the year 1539. Like many of his contemporaries and predeceſſors, he was brought up to the buſineſs of a goldſmith, but ſtudied drawing, in which he ſo much excelled under Franceſco Raibolini, ſurnamed Francia, from his attachment to whom, Raimondi himſelf obtained the cognomen of Francia. His earlieſt prints, as far as is known, were “The four Heroes,” and “Pyramus and Thiſbe,” the latter of which is dated in the year 1502, when he could have been only 14 or 15 years of age; theſe early works are both engraved after the deſigns of this maſter, and the letter F, which forms part of the monogram, affixed to them, may be ſuppoſed to ſtand for either Francia or fecit.

Our artiſt, however, is now generally known by his baptiſmal names, Marc Antonio. Being eager for improvement in his art, he travelled to Venice, where he firſt met with the works of the German engravers, particularly a ſet of wood cuts by Albert Durer, repreſenting “The Life and Paſſion of our Saviour.” Theſe pleaſed him ſo much, that he purchaſed them, though they coſt him nearly all the money he had brought with him; and he copied them with great exactneſs on copper. The deception, it ſeems, anſwered well to Marc Antonio; for, we are told by Vaſari, that they were frequently ſold for the originals. This circumſtance, according to the ſame author, coming at laſt to the ears of Albert Durer, he complained to the ſenate of Venice of the injury which he had ſuſtained, but all the redreſs he could obtain was, that Marc Antonio ſhould not, for the future, add the cypher or monogram of Albert Durer to any of the copies he might make from his engravings. This ſtory, if true, is not without its difficulties, and one of the moſt ſtriking is, that the copies which Marc Antonio made from the Life and Paſſion of Chriſt, by Albert Durer, have not the mark of that artiſt at all upon them, but the cypher of Marc Antonio only. Vaſari indeed might have miſtaken the life of Chriſt for the life of the Virgin, by Albert Durer, becauſe Marc Antonio copied them both with equal preciſion. The latter are much larger than the former, and have the monogram of Albert Durer repreſented in the ſame manner as upon the originals; and to theſe Marc Antonio has not put his own cypher, except upon the laſt plate; but even that has the monogram of Albert Durer alſo. Of courſe, theſe prints will much better agree with the ſtory above related, than thoſe mentioned by Vaſari.

When Marc Antonio quitted Venice, he went to Rome, where his merit ſoon recommended him to the notice of Raphael, who not only employed him to engrave a conſiderable number of his deſigns, but formed an intimate friendſhip with him, and it has been ſaid, though without ſufficient authority, that he aſſiſted him in tracing and correcting the outlines upon the plates.

The firſt plate he engraved from a drawing of Raphael's was, “Lucretia ſtabbing herſelf,” in which he ſeems to have exerted all his abilities to make it neat and delicate. Soon afterwards he executed the plate of “The Judgment of Paris,” which, though not ſo neat as the former, has more freedom and ſpirit. Raphael himſelf was ſo perfectly well pleaſed with the works of this admirable engraver, that he ſent many ſpecimens of them, as a complimentary preſent, to Albert Durer, which he thought well worthy of his acceptance.

The great reputation which Marc Antonio acquired under the patronage of Raphael, brought many young Italian artiſts to Rome, in order to ſtudy under him; and among them were the following: Agoſtino de Muſis, Marc de Ravenna, Giulio Bonaſoni, Niccolo Beatrici, and Enea Vico, who all of them became his pupils, and as his name began to be known abroad, Bartolemeo Beham, George Pens, and James Binck, with others, natives of Germany, came into Italy, and frequented his ſchool. For engraving ſome plates after the deſigns of Julio Romano, of which the ſubjects are taken from the lewd ſonnets of Aretin, he was committed to priſon by pope Clement VII., but recovered his freedom through the intereſt of Baccio Bandinelli.

After his releaſe, Marc Antonio, to manifeſt his gratitude to Bandinelli, engraved, from a picture of his, that admirable print repreſenting the Martyrdom of St. Lawrence; and ſucceeded ſo happily, correcting carefully ſeveral faults which were in the picture, that the pope, who was a great lover of the arts, upon ſeeing an impreſſion from the plate, pardoned his offence entirely, and took him under his protection. We now ſee our artiſt in the zenith of his good fortune; but his decline was ſtill more ſudden than his advancement: for the city of Rome being taken by the Spaniards, A.D. 1527, Marc Antonio loſt in the pillage all the wealth he had accumulated. He retired afterwards to Bologna, where perhaps he died; but of this there is no certain account. The laſt dated print we have by him is, "The Battle of the Lapithæ," engraved in 1539; after which time, we hear no more of him, or of his works. Malvaſia indeed affirms, that he was aſſaſſinated by a nobleman of Rome; becauſe he had, contrary to his engagement, engraved a ſecond plate of the Murder of the Innocents, after a deſign of Raphael. This deſign was certainly twice engraved by Marc Antonio, with very ſmall variations, as will be mentioned below. Baldinucci, following Malvaſia, mentions this ſtory; and adds, that Marc Antonio was married, and that his wife was alſo an engraver. But the total ſilence of Vaſari as to this circumſtance, renders it exceedingly doubtful.

The ſtyle and the principal works of ſo diſtinguiſhed an artiſt, the founder of the Roman ſchool of engraving, call for particular comment. In his fifth lecture, delivered at the Royal Inſtitution, Mr. Landſeer ſays, "The ſtyle of Marc Antonio poſſeſſes not the exteriors of oratory; but he pronounces every ſentence ſo diſtinctly, with a confidence ſo modeſt, and an emphaſis ſo true to Raphael and to nature, that thoſe who attend are convinced, without being perſuaded. To ſpeak without a metaphor, there is ſomething in his manner of employing his graver, ſomething dry, unambitious, ſevere, unattractive to the ſenſe; which, by all ſound critics, has been thought to deſerve praiſe, without deſiring it; and peculiarly appropriate to the works of a painter, who not merely does not require, but will not admit, the aid of foreign ornament.

"The Dead Chriſt of Raphael, where the exceſs of his mother's ſorrow is ſoftened, but not ſubdued, by her divine reſignation, he repeated with variations; of which the principal are, that, in the ſecond plate, the Virgin Mary appears much younger than in the firſt, and her right arm diveſted of drapery; from which circumſtance, it is known among collectors by the appellation of "The Virgin with the naked Arm." The ſecond plate is more delicately engraven, but is feeble, when compared with the maſterly vigour he has ſhewn in the firſt. The nudities are here drawn with Marc Antonio's, inſpired by Raphael's, uſual ſuperiority; but the drapery and ground are ſoftened and enriched beyond the ordinary powers of Marc Antonio's graver, and are ſo much in the improved ſtyle of his pupil, George Penz, as may incline us to ſuſpect that theſe parts have been engraven by his hand. Whether Raphael authorized or allowed Marc Antonio to ſubſtitute the younger virgin, who ſeems more like the ſiſter, for the elder, who is the mother of Chriſt, does not appear.

"In "The Virgin of the Palm," Marc Antonio diſcovers, if poſſible, a ſtill more exquiſite feeling, and of courſe produces a more perfect tranſlation, of Raphael. Chriſt is beſtowing his benediction with the ſublimity of inſpiration; and St. John receiving it with dignified and divine, though infantile, ſubmiſſion. The ſubordination of parts is juſt: the whole is perfectly graceful; and the head of the Virgin Mary, the moſt graceful part of that whole.

"Marc Antonio's powers as an engraver appear not to have declined from their acme, in his martyrdom of St. Lawrence, after Bandinelli. He not merely copied, but his long acquaintance with the works of Raphael enabled him, and his gratitude to Bandinelli, who had obtained his releaſe from priſon, diſpoſed him, to improve the drawing of his original. The print is defective, yet not more ſo than many other of his works, in chiaroſcuro: but, expreſſion of the textures of ſubſtances, and the exiſtence of reflex light, are here feebly acknowledged; the folds of the draperies are ample; the drawing of the naked excellent; and the characters of the heads far better than would ſeem to belong to the reputation of Bandinelli."

The ſeveral monograms with which Marc Antonio marked his engravings, from time to time, will be found in *Plate* I. of thoſe of the *Italian School of Engravers*; though a great number of them were publiſhed without any other mark than an intelligent eye will perceive, in the peculiar ſtyle and purity of outline of this accompliſhed artiſt.

Connoiſſeurs are extremely, and very juſtly, obſervant of the goodneſs of the impreſſions, in collecting the works of Marc Antonio; and early and well preſerved impreſſions ſell for very conſiderable ſums. Since they were firſt publiſhed, the plates have been ſucceſſively the property of Thomaſo Barlacchi, Antonio Salamanca, Antonio Lafreri, and Nicholas Van Aelſt; laſtly, they became the property of the print-dealer Roſſi, at which time, after being frequently retouched, and of courſe very much impaired, they were, as works of art, utterly worn out. Thoſe impreſſions are the earlieſt, and by far the moſt valuable, which were taken before the name of any publiſher was inſcribed on them.

Baron Heinnekin, in his "Dictionnaire des Artiſtes," printed at Leipſic, A.D. 1778, has given a complete catalogue of the works of Marc Antonio, to which the curious reader is referred, and from which we have extracted the following liſt of thoſe which are held in moſt eſteem, beginning with his portraits.

Portraits.—An artiſt wrapped in a mantle, ſeated, and in an attitude of meditation; a little table, pallete, and colours, in the back ground; ſuppoſed by Malvaſia to be the portrait of Raphael, drawn and engraven by Marc Antonio: Aretin the Poet, with a long Latin inſcription; one of the very fineſt works of the artiſt: the Emperor Charles V. in his youth; Pope Clement VII.; both en medallion: Pope Julius II. holding a bonnet: Prince Octavius Farneſe.

Subjects from Holy Writ.—"Adam and Eve," after Raphael, a very fine and rare print, the ſame which Strutt has copied and placed as the frontiſpiece to his ſecond volume of the Lives of the Engravers; "Adam and Eve expelled from the terreſtrial Paradiſe," after Michael Angelo; "Noah ſacrificing after leaving the Ark;" "The Bleſſing of Abraham;" "God appearing to Iſaac;" "The Eſcape of Joſeph from Potiphar's Wife;" "David diſcomfiting the Philiſtines, and beheading Goliah;" "David," an erect figure, with the head of Goliah, a very rare print; all after Raphael.

"The Adoration of the Shepherds," either from a deſign by Marc Antonio himſelf, or after his firſt maſter Francia; two plates of "The Murder of the Innocents," after Raphael, in the ſecond of which Marc Antonio has introduced the upper part of a ſmall yew tree, called by the Italians la Felchetta, and which does not appear in the firſt. Good impreſſions of both theſe plates are extremely rare and valuable; "An Holy Family:" from the thigh of the Virgin Mary being immoderately long, this print is diſtinguiſhed among connoiſſeurs by the name of "The Virgin of the long Thigh." Another "Holy Family," wherein the Infant Saviour repoſes on the knees of his mother,

ther, who is beſtowing her benediction on the little St. John. This is commonly known by the name of "The Virgin of the Palm." Another, called "The Virgin of the Cradle," from the circumſtance of the Infant Chriſt being repreſented in his cradle; and two plates of the "Virgin and Child;" all after Raphael.

An "Holy Family," after Michael Angelo; a very rare print of an "Holy Family," after Raphael, wherein St. John is holding a reel, and St. Elizabeth is ſpinning; another "Holy Family," in which the Infant Jeſus is receiving a fiſh from Tobit, diſtinguiſhed by the name of "The Virgin of the Fiſh," and after a very celebrated picture which Raphael painted for the church of the Dominicans at Naples, and which has ſince been in the gallery of the Eſcurial; "The Holy Virgin ſitting on the Clouds, with the Infant Chriſt," a plate which afterwards fell into the poſſeſſion of Agoſtino Carrache, who re-touched it, and added two fine heads of Cherubs; a ſet (mentioned above) of ſeventeen plates, coarſely copied from the wood-cuts by Albert Durer, of the "Life of the Virgin Mary," and marked with Durer's cypher, except the laſt, which has that of Marc Antonio. Theſe are in ſmall folio, and very rare. A ſet of thirty-ſix ſmall uprights, from Albert Durer's "Life of Chriſt," marked with the ordinary tablet of Marc Antonio.

A ſet of thirty-ſix ſmall uprights, called "The Life and Paſſion of Chriſt," copied from Durer, but marked with the tablet of Marc Antonio. A duplicate ſet of theſe are by ſome critics ſuppoſed to be the production of Wierix, or ſome other of the diſciples of Marc Antonio, and this ſet bears the cypher of Albert Durer. "Chriſt at the Entrance of the Temple, ſurrounded by his Diſciples;" "St. Mary Magdalen at the Feet of our Saviour;" "Chriſt celebrating the Paſſover;" "The Deſcent from the Croſs," in which, with the holy women, is introduced Joſeph of Arimathea. Three prints, which are known among collectors by the title of "The Virgin of Grief." In one the Holy Virgin with extended arms is lamenting over the dead body of Jeſus Chriſt. In the ſecond, of which we have ſpoken more particularly above, and which is alſo called "The Virgin with the naked Arm," the holy mother appears much younger than in the firſt, and a dead tree is omitted: in other reſpects the two compoſitions are alike. And in the third, which is alſo a dead Chriſt, his head reclines on the lap of the Virgin; mount Calvary is in the back ground, and three diſciples with Nicodemus are preſent. A glorified Chriſt with the Holy Virgin, St. John the Baptiſt, St. Paul, and St. Catherine, called "The Five Saints;" three of the cartoons, viz. "The Death of Ananias," (engraven in conjunction with Agoſtino Veneziano;) "Elymas ſtruck Blind," and "St. Paul preaching at Athens." Proofs of the latter, before the two figures were placed within the baluſtrade of the temple of Mars, are extremely rare and valuable. St. Cecilia, with the Magdalen and other ſaints, known by the name of "The Saint Cecilia with the Necklace;" "The Martyrdom of St. Felicité." A duplicate plate of this ſubject, in which the right ear of the ſaint is omitted, is more ſcarce and valuable than the former. "St. Catherine reſting on her Wheel of Martyrdom." A ſet of thirteen, of Jeſus Chriſt and the twelve apoſtles. All theſe are of folio dimenſions, and after Raphael.

"The Martyrdom of St. Laurence," a large folio, after Baccio Bandinelli, is a very fine engraving, which obtained Marc Antonio's releaſe from priſon, and recommended him to the favour of pope Clement VII. "St. George and the Dragon," either from a compoſition by Marc Antonio himſelf, or after his firſt maſter Raibolini. "St. Gregory celebrating Maſs," from Albert Durer's wood cut, entitled "The Myſtery of the Maſs."

Subjects from Profane Hiſtory and Greek Mythology— "The Rape of Helen," a grand compoſition: "Æneas retreating from the Conflagration of Troy, bearing off Anchiſes, and preceded by the young Aſcanius;" "Venus appearing to Æneas in the Diſguiſe of a Huntreſs;" (an early work of the maſter;) "The Death of Dido;" "The Death of Lucretia," inſcribed in the Greek language, "better to die than live diſhonoured," and the firſt plate engraved after Raphael by Marc Antonio; a ſubject, by ſome termed "Alexander the Great depoſiting the Poems of Homer in the Coffer of Darius," and by others "The Books of the Sybils placed in the Tomb of Numa Pompilius." A battle-piece, known among connoiſſeurs by the title of "The Battle of the Cutlaſſes," all after Raphael, and in folio.

From the ſame maſter he has engraven "The Three Angles of the Lodge of Chigi," of which the ſubjects are, 1ſt. "Jupiter careſſing Cupid;" 2d. "Mercury deſcending from Olympus," and 3d. "Cupid and the Graces." A very grand compoſition of "The Judgment of Paris;" and from Andrea Mantegna, "Mars, Venus and Cupid," of which the collector ſhould be careful to obtain thoſe impreſſions that were taken before the name of Roſſi was added as the publiſher. "Apollo leaning againſt the Shepherd Hyacinthus, and accompanied by Cupid," is either after his firſt maſter Raibolini, or from a deſign by Marc Antonio himſelf. A tablet is here ſuſpended, from a tree, on which is inſcribed the date 1506, and A.E. 19 is added, which gives the year 1487 as that of his nativity.

"The Triumph of Galatea" is a capital print, of which the beſt and rareſt impreſſions are before any letters, and thoſe with the names of Van Aelſt and Roſſi are comparatively worthleſs.

"Mount Parnaſſus" is a large and grand compoſition from the celebrated picture in the Vatican, except that Marc Antonio has very properly ſubſtituted a lyre for a violin; the inſtrument upon which Apollo is playing in the original picture. It is not improbable that Raphael himſelf, having diſcovered the anachroniſm, directed this emendation.

The above two are after Raphael. A very fine engraving of a Bacchanalian ſubject, with children bearing baſkets of grapes, and Bacchus ſeated on a tub, is alſo after Raphael, but was drawn by him from an antique bas-relief; "Bacchus and Silenus" is by ſome critics ſaid to be after Julio Romano, and "Hercules ſmothering Antæus," after Michael Angelo: but others aſcribe both theſe compoſitions to Raphael.

"The Battle of the Lapithæ," the laſt work of Marc Antonio, is of the frieze form, dated 1539, and after Julio Romano. Of "Orpheus" the deſigner is not certainly known. "Pyramus and Thiſbe" is after Raibolini. "Le quos ego," or Neptune appeaſing the Tempeſt which had diſperſed the Fleet of Æneas, is ſurrounded by a border, in which are nine ſmall compartments, containing ſubjects from the Æneid, and is after Raphael. Impreſſions of this plate, before it was retouched, are rare and very valuable. The diſagreeable hardneſs which the abdominal muſcles in the figure of Neptune have acquired in the retouching, renders them eaſily diſtinguiſhable.

The above are all of folio dimenſions. In quarto, Marc Antonio has engraven a ſet of twenty amorous and indecent ſubjects after Julio Romano, to accompany the ſonnets of Aretin, of "The Loves of the Gods and Goddeſſes," which are, as they certainly ought to be, exceedingly ſcarce, and a ſet of thirty-two, of "The Loves of Cupid and Pſyche," after Raphael, each accompanied by eight Italian verſes.

Poetic Inventions, &c.—"Le Stregozzo," the deſign of which is by ſome attributed to Raphael, and by others to Michael Angelo. Sometimes it is called, "Raphael's Dream," and probably with great truth, for though it differs from the reſt of his works, yet it differs not ſo much, but that it may be the production of his mind, and it poſſeſſes all the romantic wildneſs of a nocturnal chimera. A monſtrous carcaſs is converted into a ſort of triumphal car, in which is ſeated a ſorcereſs; it is drawn by naked men, and a youth mounted on a goat is blowing a horn. It is in very large folio, and in the later impreſſions the initials of Agoſtino Veneziano are added to the mark of Marc Antonio. "Il Morbetto," or The Plague, another large folio after Raphael, good impreſſions of which are extremely rare. Three figures from Michael Angelo's Cartoon of Piſa, dated 1510, and known among collectors by the title of "The Climbers." "Il Pito," or The Triumph of Love, an allegory, by ſome ſuppoſed to be after Andrea Mantegna. "The Emperor Trajan crowned by Victory," from a bas-relief on the arch of Conſtantine; "The Chace of a Lion," from another antique bas-relief; "The Caſſolette," a grand Bacchanalian proceſſion, of the frieze form, nineteen inches in length; "An Offering to Priapus;" the ſtatues of Apollo and Cleopatra; a bas-relief of "The Three Graces," and a dance of nine children, all after Raphael.

Agoſtino de Muſis, ſurnamed Veneziano, from the place of his nativity, and called in England Auguſtin the Venetian, was born at Venice ſome time about the year 1490. He travelled to Rome for improvement, and became one of the moſt celebrated of the numerous diſciples of Marc Antonio, with whom he ſometimes worked in conjunction. From the circumſtance of his earlieſt known engraving being dated in the year 1509, Strutt ſuppoſes that he began to ſtudy under Marc Antonio, whilſt that diſtinguiſhed maſter yet reſided at Venice. Marc of Ravenna was his fellow pupil; and Vaſari claſſes them among the very beſt of the Italian ſtudents who followed the art of engraving.

When the city of Rome was taken and ſacked by the Spaniards in the year 1527, Agoſtino retired to Florence, and applied for employ to Andrea del Sarto, who was then in high repute, but del Sarto, diſſatisfied with the dead Chriſt which he had already engraved after his deſign, refuſed to permit him to engrave any more of his pictures. Agoſtino afterwards returned to Rome, where he followed his profeſſional purſuits with great ſucceſs, and where he died ſome time about the year 1540.

He generally marked his prints with the initials A. V, which were ſometimes inſcribed on a tablet. He imitated the ſtyle of his maſter with great attention, and, as far as regards manual execution, with conſiderable ſucceſs: ſometimes, indeed, he in this reſpect excelled Marc Antonio; but in point of taſte, and in the purity and correctneſs of his outline, he fell far ſhort of that diſtinguiſhed artiſt.

Good impreſſions of the works of Veneziano are now become extremely ſcarce, and a compleat ſet is hardly to be obtained; among them will be found a few, wherein he has expreſſed the fleſh entirely by means of ſtippling, in a manner which, being imitated by Boulanger, grew by degrees into what is now termed the *chalk* manner of engraving. The following liſt is believed to contain the deſcription or titles of his beſt performances.

Portraits of Charles V. after Titian, ſuperſcribed with ſixteen Italian verſes; another of the ſame emperor, inſcribed "Progenei divum quintus ſic, &c. Æt. ſua XXVI.;" a profile of pope Paul III. in a leathern cap; the ſame, wearing the papal crown, dated MDXXXVI.; all in folio. Ferdinand king of the Romans, in 4to. Francis I., of France, dated 1536; a profile of the emperor Soliman, dated 1535; Barbaroſſa holding a turban; all in folio.

Subjects from Sacred Hiſtory.—"The Creation," a folio plate, engraved partly by Agoſtino and partly by Marc of Ravenna, and inſcribed "Exc. Deus enim Omnia," &c. "Abraham offering up Iſaac;" "The Benediction of Iſaac," dated 1522; the ſame ſubject, with ſome trifling variations, dated 1524; "The Paſſage of the Red Sea," engraved in conjunction with Mark of Ravenna; "The Fall of Manna," a plate which preſumptively was begun by Marc Antonio, and finiſhed by Veneziano, all after Raphael and of folio dimenſions. "Samſon bound by the Philiſtines," a circular print, nine inches in diameter, is ſuppoſed to be from a compoſition by Veneziano himſelf.

"The Queen of Sheba viſiting Solomon," after Raphael, has been attributed to the graver of Marc Antonio, but is by Agoſtino and Marc in conjunction, and one of their early performances. It is of the folio ſize.

A ſet of the four evangeliſts, in 4to. is after Julio Romano. "The Annunciation" is after Raphael, and engraven by the friends and fellow ſtudents Agoſtino and Marc; "The Nativity" is after Julio Romano; and both are of folio dimenſions.

"St. John the Baptiſt in the Deſert," of anonymous invention, dated 1532; perhaps deſigned by the engraver himſelf. "The Maſſacre of the Innocents," a rare engraving, is copied from the celebrated print of Marc Antonio; "The Laſt Supper," in folio, after Albert Durer; the ſame ſubject in ſmaller folio, attributed to Raphael; "Chriſt bearing the Croſs," in folio, after Raphael, dated 1519; "The dead Chriſt," after Andrea del Sarto, a folio print, with which, as mentioned in our biography, the painter was ſo diſſatisfied, as to refuſe Veneziano the liberty of engraving from his works during his own lifetime. Another dead Chriſt, in ſmall quarto, after Albert Durer, a very rare print; "The Archangel Michael," in folio, after Raphael; "The Holy Family," in ſmall folio, marked only with the initials of our artiſt, and probably from his own compoſition; another "Holy Family," after Francia, dated 1516; "The Holy Virgin and Child, ſitting on a Pedeſtal," ſix friars and a nun are preſent, and above are two angels, holding a tablet with an Ecce Homo, in folio; "The Crucifixion," with ſix figures of ſaints and angels receiving the blood of the Saviour, dated 1528, and alſo in folio; "St. Jerome," after Raphael, in quarto; "St. Margaret kneeling, and putting a Demon of the Serpent Form to Flight, by means of the Mirror of Truth," an early performance of Agoſtino, engraved before he frequented the ſchool of Marc Antonio.

Subjects from Greek Mythology and Hiſtory.—"Iphigenia en Tauride," an anonymous plate, in quarto; "Diogenes lying on his Cloak near the Margin of a River," a ſmall engraving after Baccio Bandinelli; "The Loves of Alexander and Roxana," an anonymous plate, in folio, the deſign of which Vaſari attributes to Raphael; "Tarquin offering Violence to Lucretia," in 4to. after the ſame maſter; a very fine copy of Marc Antonio's print of Lucretia, in quarto, with Latin verſes beneath. "Camillus redeeming the Tribute impoſed on Rome by the Gauls," and a naked figure of Cleopatra, both in ſmall folio, and after Bandinelli; a ſmall figure of Mars, after Raphael; "Vulcan preſenting Venus with Arrows," dated 1530, and "Venus ſeated on a Dolphin," both in folio, and after Raphael; "The Aſſembly of the Gods," engraved by Agoſtino and Marc of Ravenna; attached to which, by the ſame artiſt, is "The Marriage of Cupid and Pſyche," both after Raphael. From the ſame painter, are "Leda careſſed by the Swan," in 4to.; "The Fall of Phaeton," in folio; and "Apollo and Daphne" in quarto; the latter of which is by ſome falſely attributed to the graver of Marc Antonio.

"The Diſpute between the Muſes and Pierides," an anonymous plate, in large folio, attributed by Vaſari to the pencil of Roſſo, and by the French to that of Perin del Vaga: this plate was afterwards re-touched and re-publiſhed in 1553, by Eneas Vico; "The Metamorphoſe of Neptune into a Horſe," in 8vo., after Julio Romano, dated 1516; "A Bacchanalian Triumph," in 4to., after Raphael, or, according to Mariette, after Raphael del Colle; "The Entrance of Orpheus into Inferno," a ſmall engraving, after Julio Romano, dated 1525; "The Infant Hercules deſtroying the Serpents," in ſmall folio, after the ſame maſter; "The Death of Antæus," in ſmall folio, after Michael Angelo, wherein Earth is perſonified as an old woman, dated 1533; "Hercules killing the Nemean Lion," a ſmall print after Raphael, dated 1528, and a frieze of conſiderable length, of which Mariette attributes the invention to Bandinelli, and of which the ſubject is a female figure on Olympus, blowing a trumpet, in preſence of the aſſembled deities.

Allegoric Inventions, &c.—"An old Man ſeated on a Bank, with a Cottage in the back Ground," one of the few plates wherein Agoſtino has ſtippled the fleſh with the graver. Providence: on a tablet held by two angels is inſcribed "Cauſar. Cognitio:" this is a ſmall folio, and after Marc Antonio; "The Cumæn Sybil," after Raphael, in 4to., and dated 1516; "The Cemetery," in large folio, after Bandinelli. This is the print ſometimes called "The Skeletons of Baccio," wherein Death is repreſented tearing a book in preſence of various other ſkeletons; "The Battle of Charles the Raſh," a ſmall folio, dated 1518; "The Climbers," being part of Michael Angelo's Cartoon of Piſa, in large folio; "The Academy of Baccio Bandinelli," alſo in large folio; "A Combat between Five Warriors," alſo ſaid to be from the celebrated Cartoon of Piſa, in 4to.: "The Three Marys (veiled figures), on their Way to the Sepulchre," in folio, an anonymous deſign, but attributed by Huber to Michael Angelo; another from Michael Angelo's Cartoon of Piſa, in 4to., a very rare print; "A Shepherd careſſing a Shepherdeſs," in folio, after Raphael; "An aged Philoſopher meaſuring a Diſk," after Dominic Campagnola. A very rare print in 4to., after Raphael, of "A Female reſting her Right Hand on a Vaſe;" "A Dance of Fawns and Bacchantes," of the frieze form, dated 1518, after an antique bas relief, but by ſome aſcribed to Primaticcio. A ſet of ſixteen plates of bronze and marble vaſes, from the antique, in ſmall folio, inſcribed "Sic Romæ Antiqui Sculptores," &c. Another ſet of thirty-ſix, in 4to., of groteſque ſubjects, after Raphael, ſome of which only are marked with the cypher of Agoſtino; the reſt are by other pupils of Marc Antonio. A ſet of forty-eight buſtos, in 4to. "The Arch of Conſtantine," in a circle, dated 1517.

Marco Ravignano, commonly known by the name of Marc of Ravenna, was born at Ravenna in the year 1496. He ſtudied at Rome, and became the pupil of Marc Antonio, and co-diſciple and friend of Agoſtino of Venice.

As long as Raphael lived, *i. e.* till the year 1520, our two engravers worked together, after which each began to engrave on his own account, and to mark his prints with his own peculiar cypher.

Mark died at Rome about the middle of the 16th century. Strutt ſays of him that he "imitated the bolder ſtyle of engraving which was adopted by his maſter, with great accuracy; but when he attempted to follow him in his neateſt manner, he was not equally ſucceſsful. He handled the graver with more freedom than his fellow ſcholar de Muſis, who, however, ſurpaſſed him in neatneſs and preciſion.

Ravenna drew well, as his beſt prints ſufficiently teſtify; though not with that purity of outline which diſtinguiſhes the works of his maſter; neither are the extremities of his figures marked with equal correctneſs or judgment. His works, however, are juſtly held in eſtimation by the curious.

The uſual mark adopted by this artiſt is a cypher, compoſed of an R and an S joined together, which has been the occaſion of ſeveral miſtakes, not only with reſpect to his works, but with reſpect to himſelf; and has led ſeveral authors to ſuppoſe that there were two Ravennas, the one named Marco, and the other Silveſtro; and they have been confirmed in this opinion by the declaration of Vaſari, who tells us, that Marco da Ravignano, for ſo he writes the name, marked his plates with an M and an R, which, in ſome few inſtances, he certainly did. Thoſe, who do not ſuppoſe there were two Ravennas, have imagined that theſe two letters were deſigned for Raphael Sanzio, and placed upon the plate to denote that it was taken from a deſign by that maſter. This opinion, however, is eaſily confuted; for the ſame mark is found on "The Slaughter of the Innocents," after Baccio Bandinelli, and of courſe cannot, by any means, refer to Raphael. It certainly ſhould be read *Ravenna* or *Ravignano, ſculpſit*. He ſometimes marked his engravings with a ſingle R, without the S, and at others, as will be found in our *Plate* I. of the Monograms, &c. of the *Italian School*.

Of the engravings of Ravignano, the following are thoſe which are held in moſt requeſt, beginning with the

Sacred Subjects.—A ſet of twelve, of the frieze proportions, from Bible hiſtory, after Raphael; "The Slaughter of the Innocents," a large folio plate, after Bandinelli. A duplicate plate of the ſame ſubject, differently cyphered, and without the name of the painter; "The Transfiguration," marked with an R on the bole of a tree, under which a diſciple is ſeated; "The Laſt Supper," marked R, and from the ſame original as that by Marc Antonio; and "The Virgin of the long Thigh," varied from that by Marc Antonio, by the introduction of a ſmall keg, all in folio, and after Raphael; "The Holy Family," after Polidore, in folio. A ſet of thirteen, of the Saviour and Apoſtles, in 4to., after Raphael, and diſtinguiſhable from thoſe of Marc Antonio, by the cypher of Ravenna; "The Victory of St. Michael," in ſmall folio, after Raphael; "The Cemetery, or Memorial of Death," in folio, after Bandinelli, but differing ſo widely from that by Agoſtino de Muſis, both in particulars and the general compoſition, as to warrant an opinion that it is engraved from another deſign.

Profane Subjects.—"The Rape of Helen," and "Alexander depoſiting the Works of Homer in the Coffer of Darius," both in folio, and after Raphael. A pair in folio, of "The Interview between Scipio and Hannibal," and "Scipio's Victory over the latter," after Julio Romano. A ſmall anonymous print of an armed Jupiter, the deſign of which is attributed to Salviati; "Venus quitting Juno and Ceres," a ſmall folio, from the fable of Pſyche; "The Triumph of Galatea," in large folio, marked with an R;

and "Jupiter and Antiope," in ſmall 4to., all after Raphael; "Euridice in Inferno," engraved in the taſte of Marc Antonio, apparently after Julio Romano; "A Nymph and Triton," in 4to., anonymous, but after Raphael; "Polyphemus, attended by Cupid, purſuing Galatea;" "The Triumph of Galatea," and "Apollo as a Shepherd guarding the Flocks of Admetus," all in 4to., and after the deſigns of Raphael. A ſet of three prints, called "The Nymphs of Marc Antonio:" the firſt, accompanied by Cupid, is drawn by two marine monſters, the ſecond is watched by a ſatyr, and the third is drawing a thorn from her foot, all after Raphael; "The Birth of Venus," in folio; "Cupid mounted on a Dolphin," in 4to.; "Vulcan forging Arrows for Cupid," in 4to., all after the ſame painter; "A drunken Silenus, ſupported by two Bacchantes," an anonymous print, in 4to.; "A Satyr holding a Nymph in his Arms," anonymous alſo, but ſuppoſed to be after Julio Romano; and "A Combat between a Satyr and a Goat," of anonymous deſign, both in 4to.; "The Combat between Entellus and Daret," in folio, after Raphael; "Orpheus," in 4to.; "Poeſy," a duplicate plate, or copy from that by Marc Antonio, of the ſame ſubject, in 4to., dated 1542; "Infant Bacchanals," from Julio Romano, in folio. An emblematical ſubject, in which are repreſented a lion, a fox, and a dragon, with the word "Ergo," an oval print.

Antique Bas Reliefs, Statues, &c.—A ſacrifice from the antique, in 4to. The ſame ſubject reverſed. A bas-relief, from the arch of Conſtantine, in folio. An antique frieze with architectural decorations: the ſubject is three cupids, or genii, two of whom hold ſhells, and the other a trident. The original is preſerved in Ravenna, the native city of our artiſt, in the church of St. Vital, with the inſcription "Opus hoc antiquum repertur Ravennæ in aed divi vitalis MDXVIII." A battle piece, in folio. A female conducting a lion towards a funeral pile. Notwithſtanding that this print is inſcribed with the cypher of Marc of Ravenna, it is ſo much in the ſtyle of Marc Antonio, that ſome connoiſſeurs attribute it to his graver. A ſet of four bas-reliefs from the Trajan column, in ſmall folio, and in a ſlight unfiniſhed manner. The antique group of the Laocoon, a large upright folio, and exhibiting the only inſtance which has come to our knowledge, where the artiſt has inſcribed his name nearly at length, omitting only the letter A in Marcus. Another engraving of this group, in folio, marked with the ordinary cypher of our artiſt, and inſcribed on the baſe "Prout in II. deneidos P.V. Maronis." It is ſuppoſed by many that Raphael made the drawing for the latter print: both of them are rare and remarkable, as ſhewing the exact ſtate of this wonderful monument of art at the time when it was diſcovered.

The remainder of Ravignano's engravings from the antique are, the equeſtrian ſtatue of Marcus Aurelius, in folio, inſcribed "Sic Romæ aca ſculp. ante Portum Eccl. &c." The three Graces. A naked female drawing a thorn from her foot, called "The Venus of the Rabbit." Two females with a caſſolette or cenſer, after Raphael. Statue of a man ſitting, inſcribed "Roma in Capitoli," all in 4to. Mutilated ſtatue of an emperor, marked with the large R, a ſmall folio plate.

Julio Bonaſoni, or Bonaſone, was a native of Bologna, and for that reaſon is ſometimes called Bologneſe: he was born in the year 1498, and died at Rome in 1564. He ſtudied the rudiments of art under Laurent Sabatini, a Bologneſe painter, but afterwards became the diſciple of Marc Antonio. He worked from the pictures of Raphael, Julio Romano, and other great maſters, and occaſionally from his own deſigns. Excepting one or two ſubjects, in which he called in the aſſiſtance of the point (which, however, he never well underſtood the uſe of), his plates are executed entirely with the graver, in a manner though much varied from that of his tutor, yet evidently founded upon it. It is neither ſo firm, nor ſo clear and maſterly. His drawing is often heavy, and the extremities of his figures frequently neglected. The folds of his draperies are ſeldom well expreſſed, and the back-grounds to his prints, eſpecially his landſcapes, are extremely flat and ſtiff. However, with all theſe faults, which are not always equally conſpicuous, his beſt prints are not without their merit; and though not equal to thoſe of his maſter, are held in no ſmall degree of eſtimation by the generality of collectors. One thing in particular is remarkable in them, namely, the attempt which he has made of preſerving the maſſes, and a breadth of light and ſhadow, as well upon the groups of figures, as upon the figures ſeparately.

Mariette has written a catalogue raiſonée of 190 ſelect engravings by this maſter; and Mr. Cumberland a ſmall book, wherein he beſtows on Bonaſoni much more praiſe than he deſerves.

Bonaſoni ſometimes affixed to his prints his name at length, ſometimes he contracted it, but not always in the ſame manner; and ſometimes he employed the monogram, which will be found in our *Plate* I. of thoſe of the *Italian Engravers*. The moſt eſteemed of his engravings are thoſe which follow.

The *Portraits* of Pope Marcelle II. in 4to., anonymous; and very rare; Philippus Hiſpaniarum Princeps, Caroli V. filius," in large 4to.; Cardinal Bembo, aged 77, after Titian; Raphael d'Urbino; Michael Angelo Buonarotti, aged 72, in a circle; Franciſcus Flori of Antwerp, a Belgic painter; Johannes Bernardinus Bonifacius; and Niccolo Ardinghello, Cardinalis, annum agens XLIII.

Sacred Subjects.—"The Creation of Eve," after Michael Angelo; "Adam and Eve in Paradiſe:" they are ſitting in an arbour embracing each other; and "Adam and Eve after the Fall:" Adam is here digging the earth; Eve is ſpinning; and two children are preſent. Theſe are in ſmall folio, and from compoſitions by Bonaſoni himſelf; "Adam and Eve driven out of Paradiſe," a ſmall folio, after Amico Aſpertini; "Joſeph ſold to the Iſhmaelites;" and "The Cup found in Benjamin's Sack," both after Raphael; "The Fall of Manna and Moſes ſtriking the Rock;" on the ſame plate, after Parmegiano; all in ſmall folio; "Judith leaving the Tent of Holofernes," a large folio print, after M. Angelo; "The Nativity," deſigned by the engraver, in 4to. Another of the ſame ſubject, in folio, from a grand compoſition by Julio Romano; "The Adoration of the Shepherds," in folio, of anonymous invention, but attributed by Malvaſia to Parmegiano; "The Holy Family," a folio print, after Julio Romano; another "Holy Family," where St. Joſeph is ſeated on an aſs, deſigned by Bonaſoni; "A dead Chriſt," after Raphael; "The Entombing of Chriſt," after Titian; "The Reſurrection," deſigned by Bonaſoni himſelf; "St. Peter placed at the Head of the Church," after Raphael; "St. John and St. Peter healing the Sick," after Perino del Vaga; "St. Paul preaching to the People," an oval, after Perino del Vaga, all in ſmall folio. A large folio upright plate, arched at the top, of "The Laſt Judgment," after Michael Angelo, inſcribed "Julius Bonaſonius Bonon, propria Michaelis Angeli pictura quæ eſt in Vaticano, nigro lapillo excepit in æſque incidit;" "Jeſſe, David, and Solomon," in folio, from the celebrated picture in the Siſtine chapel, by the ſame maſter; "St. Joachim and St. Ann preſenting Mary their Daughter to the High Prieſt," after Parmegiano; "Chriſt meeting St. Peter at the Gates of Rome," after Raphael; "The Virgin and Child," after Parmegiano; "St. Cecilia," after Raphael; "St. George," after Julio Romano;" "The Emperor Auguſtus, and the Sybil," after Parmegiano, all in ſmall folio. In 4to. a ſet of twenty-nine prints, from "The Life and Paſſion of Jeſus Chriſt;" and in 8vo. a ſet of thirteen, from "The Life of the Holy Virgin."

Profane Subjects.—"Achilles dragging the Corſe of Hector at his Chariot Wheels;" after Primaticcio; "The taking of Troy," after the ſame painter, a large folio, engraved on two plates; "The Diſperſion of the Fleet of Eneas," after an anonymous, but very indifferent deſign; "Alexander and Bucephalus," in folio, from a compoſition by Bonaſoni; "Cimon nouriſhed by his Daughter," of the frieze form, after Polidore; "A Combat of Cavalry," being the firſt idea of Raphael for his battle of Attila; "Scipio wounded and retiring from the Combat," from a deſign by Bonaſoni; "The myſterious Saturn with his Three Sons," after Julio Romano. A ſet of twenty-two ſmall engravings, deſigned by Bonaſoni, of the loves, diſdains, and jealouſies of Juno; "The Rape of Europa," after Raphael, in large folio; "Mars and Venus," in folio, after Primaticcio; "Vulcan diſcovering the Amours of Mars and Venus," in 4to., of anonymous invention; "Venus attired by the Graces," in 4to., after Raphael; "The Birth of Adonis;" "The Triumph of Cupid and Pſyche;" and "Phœbus in his Car, attended by the Hours, with Time walking on Crutches before them, and a Man and Woman waking from Sleep," are all in ſmall folio, and from compoſitions by the engraver himſelf; "The Deſtruction of the Children of Niobe," after Perino del Vaga, dated 1541; "The Fall of Phaeton," in large 4to., after M. Angelo, and a group of three females, after the ſame maſter, in folio.

From Antique Sculpture and Architecture, &c.—Small buſtos of Jupiter, Juno, Latona, Bellona, and Minerva, five plates; "Hercules and Dejanira;" "A Satyr and Nymph; "The youthful Olympus holding a Flute;" "The Flight of Medea," a bas-relief; a ditto repreſenting "A Female and Two Children ſeated;" "The Loves of the Centaurs," with groteſque foliage, all in 4to.; "The Temple of Jupiter and that of Neptune," both in folio; and a conſiderable number of book-plates, the ſubjects of many of which are from the amours of the heathen deities.

Jean Baptiſta Franco, was born at Venice in 1498, and died in the ſame city, A.D. 1561. He learnt the principles of deſign in his native country; but travelled to Rome to perfect himſelf by ſtudying the works of Michael Angelo. According to Vaſari, he made a drawing after the famous Laſt Judgment of that maſter, which paſſed in his time for a chef-d'œuvre. Franco had an excellent taſte in deſign, and perfect knowledge of anatomy. He excelled greatly in the correctneſs of his contours, and the learned manner in which he indicated the play of the muſcles. But as a painter he was deficient: he knew very little of compoſition; or colouring, his pictures were therefore without harmony, and hard. He felt their imperfections, and quitting painting, applied himſelf to drawing and engraving. Of whom he learnt the art of engraving we are ignorant: it has been ſaid he was of the ſchool of Marc Antonio; but the mechanical part of his engraving bears more reſemblance to that of Julius Bonaſoni. He uſed the graver, and probably that inſtrument alone, notwithſtanding that many of his prints appear as if done with the point. His taſte was free, and he worked in a grand ſtyle; his figures were generally well proportioned, and his attitudes various and well contraſted; his heads were often ſmall, but always well deſigned and characteriſtic; and the other extremities were rendered with the hand of a maſter.

Franco generally marked his prints B. F. V. F. that is to ſay, Baptiſta Franco Venetus Fecit; and his beſt engravings are as follow:—"Abraham receiving Melchiſedec;" "The Sacrifice of Abraham;" and "Moſes ſtriking the Rock;" all in ſmall folio. "The Iſraelites receiving Manna in the Deſert;" in large folio. "The captive Kings brought before Solomon;" ditto. "The Adoration of the Shepherds;" "The Virgin ſitting at the Foot of a Rock, careſſing the Infant Jeſus, and in the back ground the little St. John;" "St. John the Baptiſt lying on the Earth;" all in ſmall folio. "St. Jerome holding a Death's Head;" a large folio print. "Jeſus Diſputing in the Temple with the Doctors of the Law;" "The Diſciples laying the Body of Chriſt in the Tomb;" large folio. "Simon the Magician, practiſing his Impoſtures before the Apoſtles;" "A Cyclop in his Forge, with Cupid at his Side;" "Hercules bending his Bow againſt the Centaur Neſſus;" "Two Leopards, two Lions, a Wild Goat, and a Griffin," from the antique; "The Donation to the Roman Church, by the Emperor Conſtantine," after Raphael; "A Bacchanal," a grand compoſition, from Julio Romano; "Triumph of Bacchus," a grand compoſition, all in large folio; "The Deluge," in ſmall folio.

Jacques Franco was born at Venice ſome time about the year 1560; and probably of the ſame family as Baptiſta. His taſte in engraving bore much reſemblance to that of Auguſtin Carrache, of whom he was the contemporary. He was a good deſigner, and marked his heads and other extremities very well: among the number of his productions, the following are the moſt eſteemed:—Part of the 4to. engravings for the edition of Taſſo's Jeruſalem, which was publiſhed at Genoa in 1590, after the deſigns of Bernardo Caſtelli; the reſt are done by Auguſtino Carrache; a collection of portraits of great men, publiſhed in 1626, dated 1596; "The Crucifixion," a ſmall piece, marked Giacomo Francho fec.; "St. Jerome," ditto; "Hercules between Vice and Virtue," from an antique bas-relief; beſides many other plates after Baptiſta Franco.

Nicholas Beatrice, Beatrici, or Beatrizet, was a native of Thionville in Lorrain, but ſtudied engraving in Italy, and chiefly at Rome. He was born ſome time about the commencement of the ſixteenth century, and continued practiſing his art at Rome till the year 1562, about which time he probably died. Whether he became the diſciple of Marc Antonio, or of Agoſtino of Venice, is not certainly known: Strutt thinks he ſtudied under the former. A ſedulous contemplation and imitation of Marc Antonio's excellent print of "Neptune calming the Tempeſt," after Raphael, certainly contributed to the formation of what little he poſſeſſed that might be called ſtyle in his art. Yet it is much more the merits of Michael Angelo, Raphael, and the other great maſters after whom he engraved, than his own, which makes his prints deſirable. for he neither drew accurately, nor had attained any conſiderable powers in handling his graver; and his knowledge of chiaroſcuro was but very ſuperficial.

The opinion which was held by many collectors, that Beatrice was the author of the engravings which are marked with a ſmall die, inſcribed with the letter B. ſeems at length to be juſtly abandoned. They are the performances of a ſuperior artiſt, and perhaps of Bartholomew Beham The marks which do belong to him will be found in our *Plate* I. of the monograms of the *Italian School of Engravers.*

The prints by this artiſt which are moſt ſought after, are thoſe which follow, beginning with his

Portraits.—Pius III. with a Latin inſcription; Paul III.; Paul IV. dated in 1558; Pius V.; Henry II. of France, dated 1558; another of the ſame monarch, with acceſſories, dated 1556; Hippolito Gonzague; Don Juan of Auſtria, in an oval, with the battle of Lepante in a cartouche, and other accompaniments; a ſet of medallions of the kings of Poland. All the above are of folio dimenſions.

Subjects from Sacred Hiſtory.—"The Death of Abel," in 4to.; "Joſeph interpreting the Dreams of his Brethren," in folio, after Raphael, one of the beſt of Beatrice's engravings; "Abigail meeting David," a ſmall folio, of which critics have diſputed, without ſettling whether the deſign is by M. Angelo, Bandinelli, or Julio Romano; "The Nativity of the Virgin Mary," after Bandinelli; "The Annunciation," after M. Angelo; "The Adoration of the Magi," after Parmegiano; "The Holy Family," after Jerome Mutien;" "The Good Samaritan," after M. Angelo; "Jeſus Chriſt on the Mount of Olives," after Titian; "The Crucifixion," after Mucianus Brixianus; "The Virgin in Grief," after M. Angelo; "The Deſcent from the Croſs," after N. Circignani; "The Aſcenſion," after Raphael; "The Converſion of St. Paul," after M. Angelo; "St. Michael's Victory over the Devil," after Raphael, all in folio; "The Holy Virgin diſtributing Roſaries," a large oval print; "The Adoration of the Holy Croſs," (an altar piece in large folio); "The Prophet Jeremiah," from M. Angelo's picture in the Siſtine Chapel; "St. Jerome," after Titian; "St. Elizabeth, of Hungary, healing the Sick," after Mucieno, all in large folio; and "The Laſt Judgment," a very large print engraved on ſeveral plates; from the far famed picture of M. Angelo.

Subjects from Profane Hiſtory, &c.—"The Sacrifice of Iphigenia," after del Vaga, or Salviati; "The Rape of Ganymede," after Michael Angelo; "The Fall of Phaeton," after the ſame maſter: Strutt ſpeaks highly of this engraving, but ſays it was not originally the work of Beatrice; "A Bacchanalian Piece," after Michael Angelo; "The Dream of Human Life," after the ſame maſter; a very ſingular allegorical print, exhibiting the influence of the paſſions, and ſaid, by ſome, to be compoſed and painted by Michael Angelo, from a viſion which he really experienced; "The Archers," from the ſame maſter; "Vertumnus and Pomona," from Jacobo Fiorentino;" "The Combat of Reaſon and Love," after Bac. Bandinelli, called here Bradin; "Combat of five Men againſt five ferocious Beaſts; two Lions, a Bear, a Bull, and a Wild Boar," anonymous, marked 1532, attributed to Julio Romano; "Battle of the Amazons," after a grand bas-relief on a ſepulchral urn in the Capitol, a large piece, on two plates; "The Battle of the Dacians," from the Arch of Conſtantine, inſcribed "Tabula marmorea Pugnæ Daciæ, &c.; "The Emperor Trajan in a triumphal Car;" "The Pantheon of Agrippa;" "The Temple of Fortune," from a drawing by Raphael; all in folio; "The Grand Circus," a large print engraved on two plates; "Front of the Farneſe Palace," after Michael Angelo; "The Statue of Moſes," from Michael Angelo; "Equeſtrian Statue of Marcus Aurelius," engraved in 1558; a ſtanding figure of Chriſt, after Michael Angelo; "Statue of the Philoſopher Anaximenes reading," ſince retouched, and re-named "St Paul;" "The Caſtle of St. Angelo;" "Siege and taking of Theonville," a bird's-eye view, dated 1558. Moſt of the above are of large folio dimenſions.

The foregoing artiſts worked with the graver only, but the art of etching had now travelled from Germany to Italy, and Leo Daris, otherwiſe called Leon Daven, or Louis d'Aveſne, who was the countryman and contemporary of Beatrice, is believed to have been among the very firſt who practiſed it in Italy. He was born ſome time about the year 1500: ſtudied at Florence and at Rome, and returned to France, perhaps to Lorrain, or ſtill more probably, to Fontainbleau, with Primaticcio, after whoſe compoſitions his principal works are for the moſt part engraved.

His ſtyle is ſingular, and though not inimitable, has not often been imitated. His plates are chiefly etched in rather a coarſe but ſpirited manner, in ſhort hatchings; his lights are kept broad and clear, but his ſhadows want degradation, his outlines are ſtiff and hard, and his heads, hands, and feet, are not correctly drawn. The following liſt will probably be found to contain his beſt engravings:—"Venus blinding Cupid," deſigned by the engraver, in 4to. A pair, of "Jeſus Chriſt," and "The Holy Virgin," each ſurrounded by a glory and heavenly hoſt, after Primaticcio; from whoſe pictures Daris alſo engraved, an "Holy Family;" "The victorious Saviour;" "Alexander and Bucephalus," an oval; "The Marriage of Alexander and Roxana;" "Cleopatra ſtanding under a Tent, holding the Aſp in her Hand, and reſting the other on a Vaſe;" "The Continence of Scipio; "The Rape of Europa;" "Danae in the Shower of Gold," an oval; "Jupiter preſſing the Clouds to cauſe Rain on the Earth;" "Venus bathing," a grand compoſition, where there is in the back ground an old woman bringing refreſhments, in a ſculptured border; "Venus entering with Mars into a Tub;" on the foreground are cupids playing with the arms of Mars, and two women with vaſes; "The Forges of Vulcan;" "The Rape of Proſerpine;" "The Chace of a Stag;" "The Repoſe of Diana after the Chace;" (ſhe is lying by the ſide of her game with a dog under her arm); marked Fontainbleau; "Hercules undreſſing to enter the Bath with Omphale," ditto; "Hercules in the Arms of Omphale, ſurpriſed by Fawns, with Flambeaus;" "Cadmus preparing to combat the Dragon;" "The Maſquerade;" "The Elephant and the Caravan," all in folio, and after the pictures of Primaticcio.

After Roſſo, our artiſt has engraven "Francis I. of France ſurrounded by his Court;" the ſame monarch entering the Temple of Glory; "Venus and Adonis;" and "The Diſpute between Neptune and Minerva."—After Lucas Penni, "The Trojan Horſe;" "Jupiter ſeated on his Throne;" "Pſyche approaching the Dragon-guarded Fountain;" and "Parnaſſus with Apollo and the Muſes."—After Julio Romano, "The Combat for the Body of Patroclus;" after Parmegiano, "Circe and Ulyſſes," and a battle, after an antique bas-relief, all in folio.

Lucas Penni was born at Florence ſome time about the beginning of the ſixteenth century, and was the brother of Giovanni Franceſco Penni, ſurnamed Il Fattore. He frequented the ſchool of Raphael, and ſtudied a conſiderable time under Perino del Vaga. He poſſeſſed conſiderable merit as an hiſtorical painter, and George Ghiſi of Mantua has engraven from ſeveral of his pictures. After viſiting Genoa and Lucca, he travelled to England, where he was employed by Henry VIII.; he afterwards went to France, and practiſed the fine arts for a while at Fontainbleau. On his return to Italy he applied himſelf to etching and engraving, and we have ſeveral meritorious prints from his hand; he ſometimes worked from his own deſign, but oftener from Roſſo and Primaticcio. His mark was uſually compoſed of an L and an R joined together, or ſeparate; for he choſe to add the word Romanus, or the Roman, to his name, or the initials of it; but it is neceſſary to caution the young collector, with reſpect to theſe marks, all of which will be found in our *Plate* II. of monograms of the *Italian Engravers*, becauſe they were uſed by other maſters greatly inferior in point of abilities to Penni, and to ſtate that his engravings are not only executed in a very ſpirited ſtyle, but alſo accurately drawn. He chiefly etched, but at times worked with the graver only.

The following is a liſt of his principal works:—"Two Satyrs giving Wine to Bacchus;" "Leda drawing Arrows from Cupid's Quiver;" "Suſannah at the Bath ſurpriſed by the Elders," all of which are from Roſſo: but the four following are from Primaticcio; "Abraham ſacrificing Iſaac;" "The Marriage of St. Catherine;" "Jupiter metamorphoſing Caliſto into a Bear;" and "Penelope at work with her Women," all of which plates are of folio dimenſions.

At the ſame period with Penni lived Franciſco Marcolini, of Forli, an ingenious engraver on wood, who engraved, printed, and publiſhed a volume, entitled "Giardino de Penſieri," ornamented with wood cuts after Joſ. Salviati. The ſubjects are emblematical and ſatirical, and are executed with conſiderable delicacy for that mode of engraving. Marcolini was alſo an architect of no mean talent.

Another engraver on wood, Giovanni Niccolo Roſſiliani, or Vicentino, alſo lived at this period, he was of Venice; of mediocre talent; engraved a few ſubjects after Raphael, and "The Entry of Henry III. into Venice."

Battiſta Vicentino, ſo called like Roſſiliani, from his birth-place, has been ſometimes miſtaken for him. According to Vaſari, he was born at Venice in the year 1500, and engraved, in conjunction with Baptiſt del Moro, fifty ſubjects of landſcapes and ancient edifices, in a firm and agreeable ſtyle; theſe are chiefly of folio dimenſions, and among them are Monte Quirinalis, the Coliſeum, &c. &c.

The Ghiſi of Mantua, each of whom was ſucceſſively termed the Mantuano, were a numerous family of artiſts. Jean Baptiſte, the patriarch of this Mantuan race, was born at the commencement of the ſixteenth century, and, according to Vaſari, was the diſciple of Julio Romano, and he was occaſionally painter, ſtatuary, architect, and engraver. In the latter art he worked with the graver only, and his ſtyle bears reſemblance to that of Marc Antonio, when mingled with the work of his pupil Penz, as in the celebrated print of "Neptune rebuking the Winds," where the lines of the ſhadows are gradually blended into ſtippled light. Baptiſta underſtood the human figure, but his drawing is mannered, and his effects deficient in harmony.

His uſual mark will be found in our *Plate* I. of monograms of the *Italian School*, and his principal engravings are: a large folio, of which the ſubject is a "Naval Combat," from a compoſition by himſelf, dated 1538; ſome heads of warriors, helmeted, in 4to.; "The Holy Virgin ſuckling the Infant Chriſt," in 4to. dated 1539; "David beheading Goliah," in folio, dated 1540; "A Warrior eloping with a Female," probably the Rape of Helen, 1539; "A River God," after Lucas Penni, in 4to.; "Mars, Venus, and Cupid," in folio; "The Conflagration of Troy," a capital print from his own deſign, of large folio dimenſions.

Georgio Ghiſi was born at Mantua A.D. 1524. He was the nephew, or, as others ſay, the ſon of Jean Baptiſte, whom we have mentioned above, and appears to have learned from him the rudiments of engraving, though in the progreſs of his ſtudies he much improved the ſtyle of his predeceſſor.

Georgio was eminently ſucceſsful in the technical and anatomical parts of the art: in particular he ſtudied the extremities of the human figure with much attention; and expreſſed the knitting of the joints and turns of the limbs with conſiderable accuracy. The knees of his figures eſpecially, he frequently drew in a manner which has been juſtly admired. There is, indeed, a ſameneſs of ſtyle in the drawing and marking of his figures, which has made it ſuſpected that he always drew from the ſame individual model, and thus obtruded a manner of his own, inſtead of rendering the forms of the great painters after whom he worked in all their variety. This may be the reaſon why he has ſucceeded ſo indifferently in working from Michael Angelo; whoſe forms he to a certain degree caricatured: the ſwellings of the muſcles being too powerfully expreſſed, the lights became divided, the maſſes confuſed, and the neceſſary degrees of roundneſs impaired in the effect. Theſe faults may be but too obviouſly ſeen in "The Laſt Judgment," engraved after that celebrated maſter, where the dorſal and abdominal muſcles, as well as thoſe of the limbs, are marked in a heavy, affected, and unpleaſing manner.

Such defects as theſe, however, which do not always predominate in the works of Georgio, are often more than counterbalanced by the degrees of truth and beauty which are found in them.

Indifferent impreſſions of his prints are by no means rare, but ſuch as are finely printed and well preſerved appear but ſeldom, yet without ſeeing them, it is impoſſible to form an adequate idea of the merits of this engraver. His monograms will be found in our *Plate* I. of thoſe of the *Italian School*: and the following are among his moſt juſtly valued performances.

"The Myſtery of the Trinity," from his own compoſition; "The Prophets and Sybils" of Michael Angelo; a ſet of ſix upright folios from the pictures in the Siſtine chapel; "The Laſt Judgment" of Michael Angelo, a very large upright, arched at the top, engraved on ten or eleven plates. The portrait of pope Julius II. after Raphael; and from the ſame maſter, "A Holy Family;" "The School of Athens," very large, and "The Diſpute of the Sacrament."

His print of "The Dream of Raphael" is of doubtful original, for while ſome call it by this name, others term it "Michael Angelo's Melancholy." It is of large folio dimenſions, dated in 1561, and repreſents an aged philoſopher contemplating a ſhipwrecked veſſel, while a nymph advances towards him: in the back-ground are ſtrange and fantaſtic appearances. Baſan ſays that Raphael had no hand in it, yet the words "Raphaelis urbinatus inventum," are affixed to it, and the ſtyle of compoſition and deſign appear to juſtify the inſcription.

Of a long 4to. ſize are, a female ſitting in a boat, to whom an old man is bringing a new-born infant, of anonymous invention; and a winged female holding a globe. The remainder are in folio, *viz.* an allegorical print, in compliment to the birth of the prince of the houſe of Gonzague, after Julio Romano: "Cupid and Pſyche crowned by Hymen," and "The Birth of Memnon," both from the ſame maſter; the latter one of the fineſt engravings from the hand of Mantuano; "Cephalus and Procris," from the ſame; "The Interview between Scipio and Hannibal, previous to the Battle of Zama;" "Regulus reviled by the Carthaginians," and "Regulus encloſed in the Caſk," all after the ſame maſter: "Venus at the Forge of Vulcan," is after Perin del Vaga; "Mars and Venus," after Raphael del Reggio; "Diana and Endymion," after Lucas Penni; "The Adoration of the Shepherds" is very large, and engraved on two plates, after Angelo Bronzini; "The Laſt Supper," after L. Lombart: "Hercules vanquiſhing the Hydra of Lerna," after Bertano Mantuano;

tuano; and after the ſame maſter, "The Judgment of Paris," "The Grecian Heroes before Troy," "The Deſtruction of Troy," and "The Cemetery," ſometimes called "The Reſurrection of dry Bones," a fine ſpecimen of the artiſt's ability, wherein ſkeletons, tombs, and emaciated figures form a grand compoſition.

Adam Ghiſi, alſo known by the cognomen of Mantuano, was a younger brother of George, and engraved much in the ſame ſtyle, though he was certainly ſomewhat inferior to his elder brother, both in correctneſs of outline, and the ability with which he handled the graver. The cypher with which he ſometimes marked his engravings, will be found in our *Plate* I. of thoſe of the *Italian School*, and among his beſt works are the following:—"Nativita de Noſtra Signore," after Julio Romano, which is thus treated: In the heavens is the Deity ſurrounded by the heavenly hoſt; lower in the compoſition is the Holy Ghoſt, ſurrounded by a radiance, and on the earth is the Holy Virgin and Child, and St. Joſeph; "The Preſentation in the Temple," after Nicolas Martinelli; a group from the marble of Michael Angelo, called "The Virgin of Pity," of which the ſubject is a dead Chriſt laying acroſs the knees of his afflicted mother. Collectors ſhould be careful to note, that in the early impreſſions, as the plate came from the hands of Adam Ghiſi, the back ground is blank, but it has ſince been re-touched, and a landſcape background added by Ant. Lefreri, who, however, has affixed his own name to the print. The above are all of large folio dimenſions.

In 4to. our artiſt has produced, "Mars preparing for Battle," and "Diana preparing for the Chace," either after Julio Romano, or from deſigns by himſelf; "Angelica and Medora;" "Diana and Endymion;" "Hercules and Ioli;" "The Choice of Hercules;" "Two Cupids conducting a Car with a river-God;" and "Two Cupids riding on Dolphins," both of the oval form; and "The God Pan playing on the Syrinx, with Venus and Cupid liſtening."

Diana Ghiſi, of Mantua, was ſiſter to the two preceding. The year of her birth has not been recorded. She was a woman of conſiderable ingenuity, and probably learned drawing and engraving from her brother George, whoſe ſtyle ſhe ſucceſsfully imitated. She employed no monogram or cypher, but marked her engravings, of which the following are the principal, with the name of Diana, ſometimes without any addition:—"A Converſation Party of three Figures," and "The Holy Family," both of anonymous invention, and perhaps done from compoſitions by herſelf; another "Holy Family," in a landſcape ornamented with ruined edifices, after Correggio, in large folio, dated 1577; another "Holy Family," after Raphael, where the little St. John is preſenting a ſcroll to the Infant Saviour, while St. Joſeph, in the back ground, repoſes on the baſe of a column, in folio; "The Virgin Mary careſſing the Infant Chriſt," after F. Salviati, in ſmall folio; "The Holy Virgin and Child ſitting on Clouds, and attended by the Archangels Gabriel, Michael, and Raphael:" this plate is probably engraved from her own compoſition, and the earlier impreſſions are without the inſcription "Regina Angelorum:" it is in large folio; "The Inſtitution of the Papacy, or St. Peter appointed Head of the Church," after Raphael; "The Woman taken in Adultery," after Julio Romano; "The Heroiſm of Horatio Cocles," after the ſame maſter, all in large folio; "The Continence of Scipio," in ſmall folio; and "The Birth of Caſtor and Pollux," which latter is perhaps the very beſt of Diana's engravings, are alſo after Julio Romano.

We ſhall add to this liſt but one more, namely, "The grand Feſtival of the Gods," after the ſame great painter, done from the celebrated picture in the palace del T. at Mantua. It is a very large production, which Diana, from a motive of convenience, has engraven on three plates.

Of Domenico del Barbiere, better known by the name of Fiorentino, we ſhall ſay but little; for, as an engraver, he merits not much, though he painted in ſtucco, under the ſuperintendence of Roſſo, with conſiderable ability. He was born at Florence in the year 1506, or thereabouts; and travelling to Fountainbleau in the year 1544, worked with credit from the deſigns of Primaticcio and Roſſo. His engravings, which are executed in a ſtiff and incorrect manner, are ſometimes marked with his name at length, with the occaſional addition of Fiorentino, and at others with the cypher which will be found in our *Plate* II. of the monogram, &c. of the *Italian Engravers*.

Beſides ſeveral plates of groups, and ſometimes ſingle figures, from the Laſt Judgment of Michael Angelo, he engraved a "Repoſo," in which the holy family are attended by angels, in large folio; "A dead Chriſt," from Salviati; and an antique Banquet, from Primaticcio; both in ſmall folio; "Mars and Venus," from Roſſo, in 4to.; and "An Angel, or Figure of Fame, ſtanding on a Globe holding two Trumpets," in folio.

We have now to ſpeak of that extraordinary artiſt, Franceſco Mazzuoli of Parma, more commonly known by his cognomen Parmegiano. He was born A.D. 1505, and died, at Caſtel Maggiore, at the early age of 35; yet in that ſhort life very high degrees of excellence were attained in the art of painting and etching, notwithſtanding that no inconſiderable portion of it was fruitleſsly ſpent in alchemical purſuits.

For an account of his merit as a painter, ſee MAZZUOLI. He acquired the firſt rudiments of art under the tuition of his two uncles at Parma, and at the age of 16 ſurpriſed the partiality of relationſhip, and even aſtoniſhed the exiſting taſte of that part of Italy, by the production of a picture of "St. John baptizing the Saviour in the River Jordan;" but the fame of Raphael and Michael Angelo ſoon attracted him from his native city to Rome, where he remained till Rome itſelf was ſacked, ſtudying with ardour from the works of thoſe great artiſts, yet at times retarded, in no trifling degree, by his unfortunate predilection for alchemy.

It has been ſtated by ſome writers, and is generally believed, that Parmegiano (if not the inventor of etching) was the firſt Italian who ſucceſsfully practiſed that art. Strutt ſays of him, with great juſtice, that "in the etchings of this great maſter we diſcover the hand of the artiſt, working out a ſyſtem, as it were, from his own imagination, and ſtriving to produce the forms he wanted to expreſs. We ſee the difficulty he laboured under; and cannot doubt, from the examination of the mechanical part of the execution of his works, that he had no inſtruction. It appears to be ſomething entirely new to him without the knowledge of any thing better. We know that he certainly was not the firſt inventor of etching, becauſe it was practiſed in Germany before he was of age to attempt it; yet it appears as if he had been unacquainted with the prior diſcovery, or only knew of it imperfectly by report; and in the latter caſe he might have been nearly as much at a loſs as in the former. The ſpirit and genius which appear through the clouds are ſuch as juſtly render his etchings exceedingly valuable; and on this account they have been often copied, and ſometimes indifferently. The mechanical part of them is ſcratched in with the point, often badly corroded with the aquafortis, and re-touched with the graver, without the leaſt appearance of knowledge as an engraver. But looking beyond theſe defects to the ſweet characters of the heads, to the elegant turns of the figures, and to the beauty and ſimplicity of the compoſition of theſe rude ſketches, what is wanting in the excellency of the mechanical part of the art, is abundantly ſupplied to the judicious eye, in the fire and animation of the maſter. The copies are always better than the originals, with reſpect to the regularity of the workmanſhip; but even the beſt of them are exceedingly defective in ſtyle and ſpirit, ſo that they are eaſily diſtinguiſhed upon compariſon. Good impreſſions of the originals are very rare; ſuch, I mean, as are not re-touched. From the foulneſs of the copper upon which he engraved, and the little ſkill he had in managing the aquafortis, his etchings are ſeldom clear or perfect in their appearance, though ſome indeed are greatly ſuperior to others in this reſpect; and thoſe perhaps he executed in the latter part of his life.

"It is alſo ſaid that he engraved many prints on wooden blocks in chiaroſcuro; but it is much more likely, as Baſan juſtly obſerves, that he was only the deſigner and director of theſe works, and that they were executed by Ugo da Carpi, Andrea Andreani, and other maſters."

The alarms of war, much more the diſtreſs and horrors of a ſiege, are deſtructive to the purſuits of an artiſt. When Rome was taken by the Spaniards, Parmegiano retired to Bologna, whither misfortune purſued him. Many of his deſigns, etchings, and chiaroſcuro blocks, were here ſtolen from him by an engraver, whom he retained in his ſervice, and whom Huber calls by the name of Antonio de Trente, and De Piles, Antonio Frontana. They were afterwards recovered, or recovered in part; but whether by legal proceſs, or the remorſe of Antonio, has not been explained. Poor Parmegiano was for a time almoſt diſtracted by the event, which, with a debt due to the church, and other misfortunes, drove him from Bologna to Caſtel Maggiore, where he ſoon after died of a fever.

The moſt important of the prints from the hand of this great maſter, are, "Moſes and the Burning Buſh," a ſmall plate, and apparently one of his firſt attempts in etching; "Joſeph ſolicited by the Wife of Potiphar," and "Judith with the Head of Holofernes," both in ſmall 4to.; an antique ſacrifice; a ſet of thirteen ſmall uprights, of Chriſt and the twelve apoſtles; "The Virgin Mary receiving Inſpiration from the Holy Spirit;" "The Adoration of the Shepherds," a ſmall upright; "The Marriage of St. Catherine," in ſmall 4to.; "A Holy Family," where the Virgin is ſeated, and the Saviour is lying in a cradle; another "Holy Family," where St. John is preſenting a baſket of flowers to the Infant Chriſt, in folio; another "Holy Family," in larger folio, where a biſhop and a ſaint are introduced; a very rare print, done with the graver, marked "Franc. Parm. fecit," and of folio dimenſions, of which the ſubject is alſo an "Holy Family;" "The Entombing of Chriſt," a ſmall upright folio, which Guido has copied of the ſame ſize; "The Reſurrection of Chriſt," in 4to.; "A Shepherd leaning on his Crook;" "A Mother inſtructing her four Daughters;" a back figure of a man with a woman ſeated by his ſide; all from his own compoſitions.

After Raphael, he has etched the celebrated cartoon of "St. Peter and St. John healing the lame Man," in ſmall folio; of which Strutt ſays, that it is one of Parmegiano's fineſt and moſt determined etchings, adding, "we ſee he has mixed his own ſweet manner with that of Raphael, in the treatment of the heads, and it ſeems to me to loſe nothing by the alteration."

We conclude our liſt of his etchings with thoſe of "Penelope engaged with her Women at Embroidery;" "Diogenes buſied with mathematical Diagrams at the entrance of his Tub;" and a ſmall folio of the "Adoration of the Magi," in chiaroſcuro.

Antonio de Trente was born at Trentin A.D. [illegible]. He ſtudied under Parmegiano, though but three years older than himſelf, and became a painter of ſome merit, and an excellent engraver in *chiaroſcuro*, which latter art he is preſumed to have learned from Ugo da Carpi. His ſtyle of engraving is by no means elaborate, and his extremities are often neglected, yet his prints are valued by connoiſſeurs. Reſpecting the robbery of his maſter, of which Huber has accuſed him, though we have thought it right to mention the report, we ſhall not very ſtrenuouſly inſiſt on the fact. Authors agree that the plates and blocks were reſtored after a time, and differ in the name of the robber; under ſuch circumſtances it would ſurely be unfair to brand with cyclopedian notoriety the memory of Antonio de Trente.

His moſt remarkable prints are, "The Virgin Mary embracing the Infant Chriſt," from Beccafumi; another "Virgin and Child," from Andrea del Sarto; "The Tiburtinian Sybil, pointing out the Saviour to the Emperor Auguſtus;" (which latter was printed in green ink,) after Parmegiano; a man holding a lyre; a back view of a man leaning againſt a bank, with a female head at ſome little diſtance; "Circe receiving the Companions of Ulyſſes," of the octagon form; "Pſyche ſaluted with divine Honours," of the ſame octagonal ſhape; all of folio dimenſions, and after Parmegiano; "The Martyrdom of St. Peter and St. Paul," a ſtill larger print after the ſame maſter, is particularly mentioned by Vaſari, in his life of Marc Antonio.

Nicolas Vicentino, known under the name of Boldrini, an engraver on wood, was born at Vienna ſome time about the year 1510. Of this ancient engraver there is very little known, but it is ſuppoſed he was a pupil of Titian, from whoſe deſigns he commonly worked. There is a large upright print by him, repreſenting Venus naked, ſitting on a bank with Cupid, and a ſquirrel appears behind on the branch of a tree; the figures, back-ground, &c. are executed in a bold, free ſtyle, chiefly with a ſingle ſtroke; but there is ſome croſs hatching in the deep ſhadows. It is marked Titianus inv. Nicolas Baldrinus Vincentinus inciabat, 1566. The following are among his beſt engravings, which are very rare:—A portrait of Jean Baron de Schwarzenberg, ſurrounded with a border of warlike implements, after Albert Durer, in folio; "The Adoration of the Kings," after Titian, marked with the cypher of Boldrini;" another large print of "St Jerome at Devotion at the Foot of a Rock," in a landſcape; "Saint Sebaſtian and St. Catherine," with four other ſaints, of a large ſize: both this and the laſt are from Titian; a large print repreſenting a mountainous landſcape, with animals, a female leading a cow, and a young man carrying a large tub; another large print of an old ape between two young ones, entwined with a ſerpent, intended as a ſatire on the boaſt of Baccio Bandinelli, that his Laocoon ſurpaſſed the antique. This wood cut has been attributed to Titian by ſome authors, and to Boldrini by others.

To Antonio Salamanca, who was born at Rome in the year 1500, have been attributed a whole length portrait of Bandinelli; "God creating the Animal World," after Raphael, both in large folio, with ſome other works, which are marked with one or other of the three monograms, which will be found in our ſecond plate of thoſe of the *Italian School*; yet Strutt doubts whether he was the author or only the publiſher of theſe engravings.

Giovanni Giacomo del Caraglio, or Caralius, ſurnamed

Jacobus Veronenſis, was born at Verona in the year 1512, and died at an advanced age at Parma. Caraglio went to Rome to ſtudy under Marc Antonio Raimondi, whoſe ſtyle he imitated with great ſucceſs, and he occupies a diſtinguiſhed rank among the engravers of Italy. He was a very clever deſigner, and poſſeſſed great knowledge in drawing the human figure, eſpecially the heads, which are in general very characteriſtic and expreſſive, but his draperies are not ſo well drawn; the folds are not broad enough, and not ſufficiently varied; and moſt of his prints are defective in the management of the chiaroſcuro. Caraglio was alſo very ſkilful in engraving gems, and executed ſome medals which added to his reputation.

Sigiſmond I. king of Poland, being informed of the merit he poſſeſſed, invited him to his court, where he lived to a happy old age, rich in royal favour, and ſurrounded by his friends and pupils. He commonly marked his prints with his name, and occaſionally with a cypher, which will be found in our ſecond plate of monograms of the *Italian Engravers*. The following are among his beſt works; "The Virgin ſitting with the Infant Jeſus under an Orange Tree," marked Jacobus Veronenſis; in 4to.; another quarto plate of "St. Anne, and other Saints, with the Virgin kneeling, holding the Infant Chriſt," marked as the former. A large folio print of "A Holy family," from the famous picture by Raphael, done for Francis I. ſince well known by the fine engraving of Edelinck. This one is without names, but there are proofs with the name of Caralius; another "Holy Family," after Raphael, repreſenting the Virgin holding the Infant Jeſus on a cradle, and careſſing St. John, who is preſented by St. Elizabeth, in folio.

F. de Poilly has engraven this ſubject with the inſcription "Deliciæ meæ eſſe." "The Marriage of the Virgin," from Parmegiano, in large folio. "The Annunciation of the Virgin," marked "Titiani figurarum ad Coſareni exemplar. Jac. Caraglio," in large folio. "The Supplication of Tantalus," after the ſame maſter, in large folio; "The Rape of Ganymede," after Michael Angelo: this plate is attributed to Caraglio, but it is without his name, in 4to.; a print in 4to. of an anatomical figure holding a ſkull in its hand, ſitting on a ſerpent, from P. Roſſi del.; "Hercules receiving the Arrows of the Centaur Neſſus," likewiſe from Roſſi, in large quarto; "Hercules killing the Robber Cacus," after the ſame, in large quarto; a large ſquare folio print, repreſenting a number of young men and women cultivating a garden, in the middle of which is a ſtatue of Priapus, after the ſame painter; a ſet of twenty prints in 4to. repreſenting the ſtatues of the heathen deities, with their attributes, in niches, from Roſſi. Profeſſor Chriſt ſays of theſe, that "the figures or ſtatues of the heathen deities, which appeared under his name, are not by him; I find theſe ancient plates come originally from James Binck." But here he is certainly miſtaken; thoſe by Caralius are dated 1526; and the copies by Binck 1530; which is four years poſterior to the firſt publication of them.

"The Loves of the Gods," in twenty ſmall upright plates from Perin del Vaga; a large folio plate of "The Conteſt between the Muſes and the Pierides;" "The Death of Meleager," and "The Creation of the Univerſe," both after Perin del Vaga, in large folio.

Jean Baptiſte d'Angelo del Moro, ſurnamed Torbido, was born at Verona in the year 1512. In his youth he frequented the ſchool of Titian, but afterwards became the diſciple of Franceſco Torbido, called Il Moro; whom he inherited both in his name and fortune. Del Moro was both painter and engraver, and in the former art was eſteemed a good colouriſt; his etchings are ſlight but ſpirited, and he drew the extremities of the figure in a very maſterly ſtyle. Among his works, we find fifty very fine landſcapes which he engraved in conjunction with Baptiſta Vicentino, of whom we have before ſpoken, and alſo the following; "The Nativity," after Parmegiano, in folio; "The Virgin bathing the Infant Jeſus, with the little St. John," in folio; "A Holy Family," wherein angels are miniſtering to the Holy Virgin and Child, an anonymous compoſition, but certainly after Raphael, in folio; another "Holy Family," from Raphael, in large folio; a battle piece, in large folio; "The Martyrdom of St. Catherine," from Bernadino Campi of Cremona; another large folio print, repreſenting a ſhepherd, with his crook, accompanied by his dog, and viſited by an angel; without names. There is a very grand compoſition by Julius del Moro, brother to the preceding artiſt, preſerved in the ſaloon, of the grand counſel at Venice, entitled "Papa Aleſſandro terzo che dona al Doge li ſtandardi e trombe nella Chieſa di S. Giovanni."

Marc d'Angelo del Moro was the ſon of Jean Baptiſta, and was born at the ſame place, in the year 1531. He ſtudied under, and was not inferior to, his father, either in painting or engraving. We are acquainted with thirty of his engravings, which are executed with conſiderable ability, among which are the following:—"The Nativity, or the Adoration of the Shepherds;" "A Holy Family;" "The Adoration of the Kings;" and "The Baptiſm of our Saviour;" all of large folio dimenſions. This artiſt died at Rome at an early period of life.

Æneas Vico, or Vicus, or Vighi, was born at Parma A.D. 1512. It has been ſuppoſed that he learned the principles of deſign of Julio Romano; and that, hearing of the great reputation which Marc Antonio had acquired at Rome by his engravings, he went to that city, and became his diſciple. He was a man of talent, though inferior to his maſter; neither his chiaroſcuro nor his manual execution are commendable; and in the latter a certain impatience of temper is but too obvious; yet he underſtood the human figure very well, and, when he pleaſed, could draw correctly. But in many of his productions the extremities are hard and heavy, and the proportions neglected. His engravings are neither ſo neat nor ſo clear as thoſe by Marc Antonio. Indeed he ſucceeded beſt when he attempted a more open ſtyle; a good ſpecimen of which is, a female figure, with her right arm extended, over which appears an owl flying in the air, from Parmegiano; it is a half ſheet print, dated 1548.

Vico ſometimes engraved on wood, and it appears that his ſmall works done in this ſtyle are ranged among his firſt productions. Of this number is a portrait of Charles V. ſurrounded with emblematical figures, in an oval, compoſed with taſte, very correctly drawn, and cut with great care. Upon a piece of a ruin, which ſerves as a tablet at the bottom, is this inſcription: "Inventvm ſcvlptvmqve ab aenea vico parmen ſc." But Vico was alſo an antiquary, and publiſhed a tract on medals, embelliſhed with engravings by himſelf, and a collection of thirty-ſix plates of engraved gems after the antique. This artiſt ended his days at the court of Alphonſo II. duke of Ferrara, but in what year his biographers have not recorded. Of his numerous engravings, the following will probably be found to poſſeſs the moſt merit.—Four medallions. Portrait of John of Medicis, in large folio, dated 1550. Portrait of Coſmo of Medicis, in his youth, in large folio. Portrait of Alphonſo, duke of Ferrara. A ſacrifice, in the antique taſte, dated 1542, in 4to. of his own compoſing. A plate in ſmall folio of the Three Graces. A Roſicrucian ſubject from the life of Virgil, inſcribed "Virgilium eludens meritas dat fœmina pænas, Romæ, 1542." "The Army of Charles V.

paſſing the Elbe," from a compoſition of his own, a large upright plate, in an oval ; "The Battle of the Amazons," the ſame, inſcribed "Bellum Amazonum," dated 1543 ; "Vulcan working at his Forge, with Venus on a Bed behind him." In the firſt impreſſions of this plate, Mars was repreſented with Venus, from Parmegiano. "The Combat of the Centaurs and Lapithæ," after Roſſo, in large folio, dated 1542 ; "The Diſpute of Cupid and Apollo in the Preſence of the Gods," from Baccio Bandinelli ; "The School of Baccio Bandinelli," with his portrait, after Parmegiano ; "The Converſion of St. Paul," after F. Salviati, all in folio ; "St. George and the Dragon," from Julio Carratinus, a very rare print, in folio ; "Judith with the Head of Holofernes," after Michael Angelo's celebrated picture in the Siſtine chapel, in folio ; "Jupiter and Leda," and a large folio print of a bacchanalian ſubject, both from the ſame maſter, marked Enea Vico, 1546. (This ſubject has been alſo engraven by Beatrizet.) "Chriſt taken from the Sepulchre," after Raphael, in folio. Another dead Chriſt, ſupported by Joſeph of Arimathea, with the Virgin and other females bewailing him, a middling-ſized upright plate, from Raphael ; "Lucretia ſtabbing herſelf," with a Greek inſcription ; "Venus and Cupid," (this has alſo been engraved by Marc Antonio) ; "The Annunciation of the Virgin," a ſmall plate from Titian. A ſet of vaſes from the deſigns of Polidoro da Caravaggio. A ſet of fifty plates, of dreſſes of different nations. And one of the Trajan column.

Martin Rota was a native of Sebinigo in Dalmatia, he ſtudied at Rome, where he paſſed his youth, but afterwards removed to Venice, and remained there till towards the cloſe of the ſixteenth century. Huber ſays he was born in 1561, but this muſt be a miſtake, ſince his print of "Jeſus Chriſt meeting St. Peter," after Raphael, is dated in 1568. It is uncertain by what maſter he was inſtructed in the art of engraving ; but his works prove him to have been a man of great abilities. He drew the human figure very correctly, and marked the extremities in a very maſterly ſtyle.

Rota worked entirely with the graver, which he managed with great delicacy, and without dryneſs, though his plates are not very highly finiſhed. Among his works is a ſet of portraits of the Roman emperors from Julius Cæſar to the emperor Alexander Severus, which he publiſhed at Venice in 1570. He commonly marked his prints with his name, and ſometimes with the ſmall wheel which will be found in our *Plate* II. of monograms, &c. of the *Italian Engravers*, and which conſtituted a ſort of pun upon his family name. His principal works are as follows.—"The Laſt Judgment," a middling-ſized upright plate, dated 1569, from Michael Angelo Buonarotti. This excellent engraving, which is juſtly conſidered as the chef d'œuvre of Martin Rota, has been copied very exactly by Leonard Gaultier ; the difference, however, is eaſily diſcovered by compariſon, the copy being much inferior to the original ; that is, ſuppoſing the original to be a good impreſſion. But a more ſtriking diſtinction is to be ſeen in the face of the portrait of Michael Angelo, which is introduced in a ſmall oval at the top ; it is turned towards his right ſhoulder in the original, and towards his left ſhoulder in the copy. "The Reſurrection," from his own deſign, dated 1577, executed in a very delicate ſtyle. Another "Reſurrection" executed in a very coarſe ſtyle ; "The Slaughter of the Innocents," from his own deſign, in ſmall folio ; "Paying Tribute to Cæſar," three figures, ſeen as low as the knees, in folio ; "The Martyrdom of St. Peter the Dominican," a middling-ſized upright plate from Titian. A "Mary Magdalen," after the ſame maſter, in 4to ; "Prometheus chained to a Rock," after the ſame ; "The Satyr Marſias flayed by Apollo ;" "Our Saviour appearing to St. Peter at the Gates of Rome," after Raphael, in folio ; "A Laſt Judgment," from his own deſign, a very fine plate, dedicated to the emperor Rodolphus II. dated 1573, in folio. Another "Laſt Judgment," alſo from his own deſign, which remained unfiniſhed at his death, but was compleated under the care of Anſelm Boodt. It is diſtinguiſhed from the former one, by two female figures in the middle of the picture, inſtead of an angel ; this latter is the moſt rare, but the former is the fineſt engraving. "The Battle of Lepanto, and Defeat of the Turkiſh Fleet," from his own deſign, dated 1572, in large folio, a very rare print, as are alſo the good impreſſions of all the plates of this maſter.

Jerome Porro was born at Padua in the year 1520. He is not mentioned by Strutt, and very little is known of the events of his life, except that he reſided for ſome years in the Venetian territory. He appears to have been a man of a mechanical turn of mind, and more remarkable for patient induſtry, than for ſuch talent as properly conſtitutes an artiſt. Huber ſays, he invented and conſtructed a ſort of ſailing car, large enough to contain thirty perſons, and there is yet preſerved at Parma an engraved curioſity from his hand, of which it is difficult to ſay, whether it exhibits more patience or want of taſte. The ſubject of this print is "The Paſſion of Chriſt," and the hatchings, which conſtitute the ſhading, are found, on near inſpection with a magnifying glaſs, to conſiſt of very delicate writing. Hence the chiaroſcuro is not effective, and the writing is not legible.

Among his other works, are a ſet of plates for an edition of the Orlando Furioſo, which was printed at Venice in the year 1548, and is now become very rare. A ſet of an hundred vignettes for "Les Impreſſi degli Uomini illuſtri de Camillo Camilli ;" and a ſet of letter-preſs engravings, neatly executed for a book, of the funeral ceremonies of the ancients, by Thomas Portacci, printed at Venice in 1591 ; this was the laſt, and perhaps the beſt, work of Jerome Porro.

About the ſame time lived Antonio Fantuzzi, or Fontuzzi, an obſcure Italian engraver, who etched a conſiderable number of plates in a coarſe ſtyle, reſembling that of Tempeſta. He ſtudied under Primaticcio, and marked his prints either with his initials, or the cypher which will be found in our *Plate* II. of the monograms, &c. of the *Italian Engravers*. Though his prints poſſeſs not much merit, rarity has conferred on them an imaginary value, and they are ſought after by the curious, particularly a bacchanalian ſubject, where Silenus is followed by a number of Satyrs, after Roſſi, dated 1543 ; "The Conteſt between the Muſes and Pierides," in large folio, after Primaticcio ; and, after the ſame maſter, "Alexander and Roxana," and "Alexander and Thaleſtris," dated 1543. A large print from the hiſtory of Pſyche, of Jupiter, Minerva, &c. in an oval ; and "Titan repoſing on the Surface of the Sea," in folio, after Bologna.

Now alſo lived Andrea Schiavone, ſurnamed Meldolla, a celebrated hiſtorical painter, who performed ſome etchings ſomewhat in the taſte of Parmegiano, and a few prints in chiaroſcuro, among which are, "The Finding of Moſes," in ſmall folio, after Parmegiano ; "The Flight into Egypt," in 4to. ; and "A Holy Family," in folio, after Parmegiano, in all of which the hatchings appear as if of white chalk on a blue ground ; in the "Reſurrection of Lazarus," the hatchings are of gold colour on a blue ground, and the ſame in "Chriſt laid in the Sepulchre," both of which are after Parmegiano ; "St. Peter and St. John," after the cartoon of Raphael, is executed in the ſame manner, as is alſo the “Rape of Helen,” in folio, from a compoſition by Schiavone himſelf; for an account of whoſe merits as a painter, ſee SCHIAVONE.

Paolo Farinato was born at Verona in the year 1522, and died in 1604. He learned the firſt rudiments of art of Antonio Badaia, but afterwards became the diſciple of Nicolo Golſino. His genius, which began to unfold itſelf at a very early age, inclined him to hiſtorical painting, and he continued, occaſionally, to practiſe that art until a late period of life. A picture from his pencil, of “The Miracle of the Loaves and Fiſhes,” adorns the church of St. George at Verona, and he painted ſeveral for the Eſcurial, where he paſſed ſome years.

Farinato's ſtyle of engraving was bold, free, and decided, and conſiſts almoſt entirely of etching: he ſometimes marked his plates, which are ſomewhat numerous, with his name at length, and at others with the initials P. F. or P. V. F., the V ſtanding for his native city of Verona.

His beſt productions in this art are, a figure of “St. John,” a ſmall upright, a ditto of “St. Jerome kneeling;” “St. Mary Magdalen, ſeated with a Book and Crucifix, &c.;” “The Holy Virgin with the Infant Chriſt and St. John,” in folio; “Angels bearing the Croſs,” a ſmall upright; “Venus and Cupid;” and “Venus at the Forge of Vulcan;” both in folio. They are all after his own compoſitions.

The three following engravings are by Horatius Farinato, who was the ſon and pupil of Paolo: he was of very promiſing talents, but died at an early period of life. Strutt ſays “he would have equalled the greateſt maſters;” but this may be ſaying a little too much. They are after his father's compoſitions, which may be one reaſon why they have generally been confounded with his works.

“The Invention of the Croſs, with St. Francis and the Holy Women,” a large folio print, marked P. F. inv. Ho. F. V. fecit. 1583. Another large folio, of “The Deſtruction of Pharoah's Hoſt,” marked Ho. P. F. inv. 1585, and “An Holy Family with St. John.”

Giacomo Batiſta Fontana was born at Verona A. D. 1524. He worked at Venice great part of his life, and died in the ſervice of the emperor. He deſigned as well as engraved, and we have ſeveral ſlight etchings by his hand, executed with the boldneſs and freedom of a maſter, though the drawing is by no means correct. Of theſe it may ſuffice to mention the following:—Several ſubjects from Virgil's Eneid, in folio, from his own compoſitions; “The Viſion of Ezekiel,” in large folio;” “The Martyrdom of St. Peter, the Dominican, in a Foreſt,” from the famous picture by Titian; (Martin Rota, and Le Fevre have alſo engraved from this picture.) “The Battle of Cadova, between the imperial Troops and the Venetians,” a middling-ſized plate, lengthways, from Titian; “Our Saviour on the Croſs,” in large folio; and twenty-eight ſmall plates from the hiſtory of Romulus, including a dedication to Ferdinand, Archduke of Auſtria, dated 1573.

Dominico Maria Fontana was born at Parma in the year 1543. Strutt has miſtakenly dated his birth in 1673. He learnt drawing in the ſchool of Bologna, and engraved chiefly after his deſigns. Le Compte and others have confounded this artiſt with Dominico Fontana, the famous architect. The following are ſome of his works:—“A Flight into Egypt;” the ſcene lies in a mountainous landſcape; “St. John preaching in the Deſert,” in large folio; “Our Saviour ſpeaking to the Women of Jeruſalem, on his way to Mount Calvary,” in folio, dated 1584; “Mount Calvary,” with a Latin and German inſcription; “The erecting of the great Obeliſk, before the Church of St. Peter at Rome,” with all the apparatus neceſſary for the elevation of ſuch an immenſe maſs, marked Dom. Fontana inv. Seb. Bonifacio ſc. 1586, a very rare piece, engraved on three large plates.

Veronica Fontana, who engraved ſmall portraits in wood with conſiderable neatneſs for that mode of art, was daughter to the above, and ſtudied the art of deſign under her father and Elizabeth Serani.

Chriſtofano, or Chriſtopher Bertelli, was a native of Rimini, in the duchy of Modena, and appears to have lived about the end of the ſixteenth century, though his engravings are not dated. He worked entirely with the graver, but in a ſtiff mannered ſtyle.

From whom he learned the art of engraving is by no means certain, and by no means important, as he neither invented a ſtyle of engraving, nor improved on thoſe already known. He engraved after Correggio and other Italian maſters; and the following are among his works: a Portrait of Octavius Farneſe, duke of Parma, in folio; “The Converſion of St. Paul,” a very grand compoſition, from Pordenone, marked “Per me Chriſtofano Bertelli,” in large folio; “The Virgin with the Infant Jeſus, and four Saints,” after Correggio, in folio; another of “The Virgin and Child, with St. George,” from the ſame painter; a folio print, repreſenting the different ages of man, marked Chriſtofano Bertelli, ſc.

Ferrando, or Ferdinand Bertelli, was of Venice, and contemporary with the preceding artiſt, to whoſe family he probably belonged; he worked after many of the Venetian maſters, but did not much diſtinguiſh himſelf, and we therefore only mention the following of his works: “Our Saviour healing the Sick,” marked Farinati pinx. F. Bertelli, exc. 1566, of large folio ſize; “Our Saviour on the Croſs,” after Julio Romano; “Venus repoſing,” after Titian, marked Nic. Bertelli, 1566. Specchio della Vita humana. In Venezia per F. Bertelli, 1566. Another, intitled “Omnium fere gentium noſtræ ætatis habitus, a F. Bertellio æneis typis excuſs. Venet. 1569,” in folio.

Lucas Bertelli, likewiſe a native of Venice, was a printſeller, but engraved ſome plates in the ſtyle of Cornelius Cort; among which are the following:—A portrait of Hippolita Gonzaga, a daughter of Ferdinand, ſigned Lucas Bertelli, exc. in 4to.; “The People of Iſrael tormented by Serpents,” after Michael Angelo; a folio print of “The Baptiſm of our Saviour,” ſigned as before, with four verſes at the bottom, beginning “Non iſti Chriſtiani latices,” &c.; another folio print of “The Magdalen waſhing our Savour's Feet;” “The Flagellation,” after P. Farinati, in large folio, inſcribed as before; “A Crucifixion,” in large folio; “The Deſcent from the Croſs,” where Nicodemus is holding the nails, a meritorious print, ſigned as before; “The Four Evangeliſts ſitting at a Table in the Temple, with their Attributes,” from Michael Coxie, in large folio; “The Laſt Judgment,” after J. B. Fontana; “An old Woman and Children, warming themſelves at a large Fire,” with eight verſes, after Titian, in folio. N. B. This engraver flouriſhed towards the cloſe of the ſixteenth century.

Fredericio Baroccio, was born at Urbino in the year 1528, and died at Rome A. D. 1612. He learnt the principles of deſign under Battiſta Franco at Venice, whom the ſuperiority of his genius very ſoon enabled him to ſurpaſs. He went very young to Rome; ſtudied with the pupils of Raphael; and, according to De Piles, was employed by pope Paul III. to paint ſeveral ſubjects in freſco. Baroccio painted both portrait and hiſtory with the greateſt ſucceſs, and particularly excelled in ſacred ſubjects; it is ſaid that he generally painted his Virgin Maries from his ſiſter, and Infant Chriſts from his little nephew.

He engraved ſeveral pictures from his own compoſitions, which, though ſlight, and not well managed with reſpect to the mechanical part, are nevertheleſs moſt admirable, on account of the expreſſion and excellent drawing diſcovered in them. His heads are very beautiful and characteriſtic; and the other extremities of his figures finely marked. Amidſt all the difficulties he appears to have met with, in corroding his plates with the aquafortis after he had etched them, and his unſkilfulneſs in handling the graver to harmonize and finiſh them, the powers of a maſter appear like the orb of ~~the~~ ſun, when ſeen through the thin clouds of morning. The following are among his beſt engravings, all of which are from his own compoſitions. A ſmall print of “The Virgin and Child,” which was never completely finiſhed at the bottom; “The Virgin and Infant Jeſus in the Clouds,” ſigned F. B. V. F. in 4to.; “The Annunciation,” a large upright plate, of which the good impreſſions are very rare; “St. Francis receiving the Stigmata,” a ſmall upright plate; “The extatic Viſion of St. Francis,” in which our Saviour and the Virgin appear to him, a large upright plate arched at the top, eſteemed the moſt capital of the engravings of Baroccio.

Battiſta da Parma, or Parmenſis, was a native of Parma, born A. D. 1530. Huber, without adverting to dates, ſays “he was probably a diſciple of Parmegiano;” now Parmegiano, as we have already ſtated, died in the year 1540.

The truth is, Battiſta ſtudied at Rome, but under what maſter it is not known; and here he practiſed the art of engraving in a ſtyle ſomewhat reſembling that of Cornelius Cort.

Among the moſt eſteemed of his productions are the following:—“The Virgin and Child appearing to St. John the Divine,” from Frederico Baroccio, ſigned Baptiſta Parmenſis fec. Romæ 1588, in folio; “Philippus II. Hiſpaniarum Rex, 1589,” in large folio; “Chriſt baptiſed in the River Jordan,” Bapt. Parmenſis dedicavit, in large folio; “The Chaſtity of Joſeph,” in large folio, dated 1592; and “Mount Calvary,” a very grand compoſition, marked as formerly.

Jacques, or Jacobus Parmenſis, was another artiſt, probably of the ſame family, from whoſe hand we have a print executed in the ſtyle of Caraglio, of “The Martyrdom of St. Peter and St. Paul,” and a middling-ſized print lengthways, from Parmegiano; it is executed with the graver, in a ſlight ſtyle, and has often been attributed to Caraglio, but the heads and other extremities are not ſo well drawn as we find them in the works of that artiſt.

Gaſpar ab Avibus, likewiſe called Gaſpar Patavinus, or Padovano, was born at Padua in the year 1530. He appears to have been the pupil of George Ghiſi Mantuanus, whoſe ſtyle he imitated, but never equalled. His prints are dated from the year 1560 to 1580, and ſigned in different manners, ſometimes with the monogram of Gaſpar, which will be found in *Plate* II. of thoſe of the *Italian Engravers*.

We ſhall notice the following of his productions: a print, in large folio, of “The Marriage of the Virgin Mary,” from Paul Veroneſe, inſcribed Gaſpar ab Avibus Citadelenſis fecit, 1577; “The Woman taken in Adultery,” marked with his cypher; “The Scourging of our bleſſed Saviour,” a large upright plate, ſigned Gaſpar ab Avibus Citadelenſis fecit, Lucæ Bertelli Formis; “Our Saviour crowned with Thorns,” marked as before, in large folio; “The Laſt Supper,” from Lamb. Lombard, in large folio; “Apollo on Mount Parnaſſus, with Pegaſus and the Muſes, Homer, and Virgil,” from L. Penni; a large volume in folio, in five parts, containing the portraits of the Emperors, Archdukes, Princes, &c. of the Auſtrian family. Each portrait is a whole length figure, ornamented with an appropriate border. Here Gaſpar has changed his uſual manner of engraving, and ſomething more of the ſtyle of the Sadelers appears in it: the figures, though ſtiff, are neatly engraven, and well proportioned.

Giovanni Battiſta Cavaleriis was born at Lagherino ſome time about the year 1530. He worked at Rome from 1550 to 1590. His ſtyle of engraving bears conſiderable reſemblance to that of Eneas Vico, the diſciple of Marc Antonio; though he has not, in every inſtance, attained the ſame degree of excellence.

Cavaleriis underſtood the mechanical part of his art very well; but his prints are defective both in chiaroſcuro and drawing, particularly in the extremities of his figures. He was a very induſtrious engraver, and, according to the abbé Marolles, his works amount to upwards of three hundred and twenty-ſeven; a great part of which, however, were but copies from the engravings of other maſters. He ſometimes ſigned his prints with his name, and at others with his cypher, which will be found in *Plate* II. of thoſe of the *Engravers of Italy*.

Among the moſt eſteemed of his works are the Frontiſpiece and Heads to the “Lives of the Popes,” dated 1588; the plates to a work on the “Life and Miracles of Apollinaris, firſt Biſhop of Ravenna,” in folio, which are coarſely etched, and ſlightly finiſhed with the graver; “Eccleſiæ Anglicanæ Trophæa,” in folio, from Nicolaum Circignano; “The Ruins of Rome,” from Jean Antonio Doſſius, in 30 plates; “Jeſus Chriſt teaching among the Doctors,” from his own deſign; “The Laſt Supper,” from his own deſign; “The Statue of the Virgin of Loretto;” “The Houſe or Chapel of Loretto, and the Miracles which were ſuppoſed to be done there,” 1569; “The Celebration of the Jubilee of 1585,” in the back-ground of which is a view of the cathedral church of St. Peter. (Here the engraver is called, for what reaſon has not been explained, Tridentinus.) And “A Naval Combat againſt the Turks,” for the book of Ciacioni, of folio dimenſions.

“The Virgin of Silence,” where the Virgin is reading, and the infant St. John making a ſign not to diſturb the ſleeping Chriſt, accompanied by St. Joſeph, from Michael Angelo, is in large folio; “The Converſion of St. Paul,” after a picture of Michael Angelo, in folio; “The Martyrdom of St. Peter,” in large folio, all ſigned with the engraver's name; “The Apoſtle St. Paul,” after Michael Angelo, in large folio; “The Animals returning from the Ark,” after Raphael, of the ſame ſize; “Moſes ſhewing the Tables of the Law to the People,” from the ſame maſter; “The Miracle of feeding the five thouſand,” in two large plates; “Jeſus Chriſt appearing to St. Peter at the Gates of Rome,” with the cypher of the engraver, dated 1569; “The Battle of Conſtantine againſt Maxentius,” a large upright, all from Raphael; “The Slaughter of the Innocents,” after Baccio Bandinelli, a grand compoſition, which was likewiſe engraved by Mark of Ravenna; “Suſannah and the Elders,” from Titian, in folio, dated 1586; “St. John preaching in the Wilderneſs,” from Andrea del Sarto; a large folio print of “The Deſcent from the Croſs,” from Daniel de Volterro. The ſame ſubject was engraved by Dorigny. “The Virgin ſeated on the Clouds, with the Infant Jeſus and Angels miniſtering to her,” from Livio Agreſti, in large folio; “The Elevation of the

Croſs," from the ſame maſter, ſigned "Opus Livio Agrelti Forlivenſis, Romæ incidabat, Joan. Bapt. de Cavalleriis," in large folio.

For an account of Paul Veroneſe, who etched ſome plates about this time, and is a diſtinguiſhed ornament of the Italian ſchool, ſee the article CAGLIARI.

Ceſar Vecellio was born at Venice ſome time about the year 1530, and died in the ſame city. He was the younger brother of the celebrated Titian, and probably the engraver of thoſe wood-cuts which are generally attributed to that great artiſt. We have by this maſter a ſet of prints in octavo, etched in a free ſpirited ſtyle, from the deſigns of Titian, of the coſtume, or various dreſſes, ancient and modern, of different parts of the world: they were publiſhed at Venice in the year 1590, entitled "De gli Habiti antichi et moderni di diverſe Parte del Mondo, Libri due fatti da Ceſare Vecellio." In the year 1664, another edition was publiſhed, more complete than the preceding, where the title is more fully explained, thus, "Raccolta di Figure delineate dal gran Tiziano, e da Ceſare Vecellio ſuo Fratello, deligentement e intagliate."

Joſeph Porta, otherwiſe called Salviati, della Grafagnano, was a native of Caſtelnuovo Grafagnano, born in the year 1535. He was the diſciple of Francis Salviati, whoſe name he aſſumed. He ſettled at Venice, where he painted, both in oil and freſco, with great ſucceſs, and performed ſeveral meritorious engravings on wood. M. Papillon ſays, that he has ſeen twelve prints by this maſter, executed on wood, of which the ſubjects were "The Prophets," and "The Sybils," "Pſyche finding Cupid aſleep," and "A Chemiſt in his Laboratory," a print ten inches by ſixteen. He continues: "But I alſo poſſeſs a print by this maſter, much ſuperior to the preceding, of "Jeſus Chriſt on the Croſs, accompanied by the Virgin, Mary Magdalen, and St. John," at whoſe feet is a little tablet, with the name of Joſeph Salviati. The characters are very admirably expreſſed, and the excellence of the deſign equals that of the execution." Porta's engraving of the Academy of Arts and Sciences, a very fine compoſition, in ſmall folio, proves that in this inſtance Papillon is no exaggerator. Andrea Zucchi, and many other Venetian artiſts, have engraved from the pictures of this maſter, who died at Rome in the year 1585.

Julius Sanuto, or Sanutus, was born at Venice A. D. 1536, but is very little known. Among the ſmall number of plates executed by this artiſt are the following: "The Birth of a monſtrous Child," ſigned Jul. Sanutus. Venet. fec. This print is executed with the graver in a coarſe heavy ſtyle, with ſingle ſtrokes, without any croſs hatching, and bears great reſemblance to a wood-cut. "Venus and Adonis," after Titian, from the gallery of the king of Spain, marked Giul. Sanuto exc. 1559; "The Fable of Apollo and Marſias," a very ſingular compoſition, from Correggio, engraved on three large plates; on the middle plate of which is introduced the Parnaſſus of Raphael.

Of Dominico Vitus it is only known that he was a native of Italy, born ſome time about the year 1536, and that he continued to engrave at leaſt till the year 1580.

He was an eccleſiaſtic, of the order of Val-Ombreuſe, a monaſtery ſituated in the Apennines, and was probably inſtructed in engraving by Agoſtino de Muſis, whoſe ſtyle he imitated, and not unſucceſsfully. He engraved ſeveral plates after contemporary painters, and likewiſe from the antique.

We have, by him, "St. Joachim holding a cenſer," from a deſign by Andrea del Sarto, dated 1580; "St. Bartholomew," inſcribed "Dom. Vitus Ordinis Valiſumbroſa Monachus excidit, Romæ, 1578;" a ſet of ſmall plates of "The Paſſion of Jeſus Chriſt," ſurrounded with borders of birds, beaſts, and fiſhes; ſeveral antique ſtatues, marked "Dom. Vitus fec.;" "Jupiter and Caliſto," in 4to.; and "A River God," from the antique, of the ſame ſize.

Raphael Guidi was born at Florence in the year 1540, and, judging from his works, appears to have been inſtructed in the ſchool of Cornelius Cort, or Agoſtino Carracci. He worked entirely with the graver, which inſtrument he handled with much facility. He drew correctly, and the extremities of his figures are very well expreſſed. Though Guidi cannot be ſaid to have equalled Carrache, yet his prints manifeſt that he was a man of very ſuperior talents. The following prints are by him, and will probably be found among his beſt performances; "King David playing on the Harp," from Joſephine, in folio (the ſame picture has been engraven by Eg. Van Panderen); "The Crucifixion," after Chriſtopher Schwartz, in folio; "Jeſus Chriſt laid in the Sepulchre," from F. Baroccio, dated 1598; "Æneas carrying his Father from the Burning of Troy," from the ſame; "Jupiter graſping his Thunderbolts," from Polidoro; and "Vulcan" from the ſame maſter, both in folio. In larger folio, and engraved with much freedom after Joſephine, is "The Fall of Icarus."

Bartolomio Paſſarotti was born at Bologna in the year 1540, and died in the ſame city A.D. 1592. It is very likely that he learned drawing in the ſchool of Thadeus Zucchero. Bartolomio was the moſt eminent of the numerous family of artiſts of his name, and excelled both in hiſtorical ſubjects and portraits. Huber claims for him the honour of having been the founder of the celebrated Academy at Bologna, where the Carracci ſo much diſtinguiſhed themſelves. He was a painter of great merit, and Ph. Thomaſſin, C. Cort, Aug. Carracci, and many other artiſts, have engraved after his pictures. He likewiſe produced many etchings from his own deſigns, and from thoſe of F. Salviati, and P. Perugino, of which the following are beſt known, and probably poſſeſs moſt merit.

"The Virgin and Child, accompanied by St. John," from his own deſign, in large folio; "The Viſitation of the Virgin," a rich compoſition, after F. Salviati; ſigned Bart. Paſſarotus fec. a very rare print, in large folio, and another large folio print of "The Marriage of Jacob and Rachael," from P. Perugino.

Marius Kartarus, or Mario Kartaro, was born in Italy ſome time about the year 1540, but the time and place of his death are unknown, and the events of his life are ſomewhat obſcure. Baſan ſays that "Marius Kartarus was an engraver, who flouriſhed in Italy about the middle of the ſixteenth century; Rodolphus Fuſeli calls this engraver Marius Cartari, who, in the year 1578, engraved at Rome the portraits of the twenty-four firſt Roman emperors, from Julius Cæſar to Heliogabalus. And Strutt thinks "that he was probably a German, though he reſided at Rome, and learnt the art of engraving in his own country; he copied ſeveral of the engravings of Albert Durer with ſome degree of preciſion: they are executed entirely with the graver; but his principal works are etchings in a coarſe, incorrect ſtyle, finiſhed with the graver. Some of them are very large, and in general from his own deſigns." Kartarus commonly marked his prints with a monogram, which will be found in our ſecond plate of thoſe of the *Italian Engravers*, and never with his name at length. The following are among his moſt diſtinguiſhed productions: "The Adoration of the Shepherds," in a very neat ſtyle, executed with the graver only; "Our Saviour crowned with Thorns," a large upright plate, alſo executed with the graver; "Diana and Endymion," a large plate lengthways; "Chriſt praying in the Garden of Olives," from Albert Durer, marked on a tablet 1567, Romæ, in folio; "St. Jerom ſeated in a Chamber," from the celebrated print of the ſame ſubject by Durer. "The Deſcent of Chriſt into Hell," from Andrea Mantegna, etched in his rough ſtyle, in folio; "The Laſt Judgment," in large folio, from the famous picture by Michael Angelo, in which print the oval at the top, that in the original picture contains the painter's portrait, is left blank.

Andrea Andreani, called Mantuano, was born at Mantua in the year 1540, and died at Rome in 1623. He learnt the elements of his art in the place of his nativity, but went afterwards to ſtudy at Rome. Andreani engraved on wood only, in the ſtyle diſtinguiſhed by the appellation of chiaroſcuro; which he performed by the help of two, and ſometimes three blocks, but never more. Among his own countrymen, he had Ugo da Carpi, and Antonio da Trento for models, whom he ſeems to have followed very cloſely in the early part of his time; but at length he carried the mechanical part of the art to a far greater degree of perfection. His great merit, as an artiſt, is acknowledged by all who are converſant in prints; his drawing is executed in a very maſterly ſtyle, and with great ſpirit; the heads of his figures, though ſlight, are characteriſtic and expreſſive; and he has diſplayed great judgment in the management of the various tints.

The number of prints by this maſter is very conſiderable, for beſides thoſe which he performed himſelf, he procured a great many engravings by other artiſts, retouched them when occaſion required, and, adding his cypher, ſold them as his own productions. This diſingenuous artifice, altogether unworthy of him, renders it very difficult to diſtinguiſh his works preciſely; for, after all, it is moſt likely that many prints are attributed to him, in the engraving of which he had no concern. He commonly marked his prints with one of the cyphers which will be found in our ſecond plate of *Italian Monograms*. The Abbé de Marolles miſtakenly calls this artiſt Andreoſſi; others have miſtaken him for Andrea Mantegna, who lived nearly a hundred years before him, and others again for Albert Altdorfer, on account of the ſimilarity of their monograms. We have endeavoured to exclude his adopted engravings from the following liſt of his works, and to ſelect the beſt of his own. A portrait of Albert Durer; "The Pavement of Sienna," after a drawing by Franceſco Vanni, from Domenico Beccafumi Saneſe, conſiſting of eight ſubjects, ſaid to be the moſt rare of all Andreani's engravings; "The Deluge," from Titian, a very large piece, on three plates: "The Army of Pharaoh paſſing the Red Sea," from the ſame; "The Adoration of the Magi," from Parmegiano, in ſmall folio; "The Purification of the Virgin," from Salviati, in folio, dated 1608; "The Virgin and Child, worſhipped by a Biſhop," half figures, from Al. Caſſolani, with the artiſt's cypher, and the words Andrea Mantuano, Pittore Saneſe, 1591, in large folio; "The Virgin, St. John, and Infant Jeſus, accompanied by a Saint," from Giac Ligozzio, in folio. Another folio print of "Our Saviour healing the Lepers," from Parmegiano; "Jeſus Chriſt healing the Paralytic," from Franceſſo de Nanto da Sahandia, in folio; "Chriſt departing from Pilate, who is waſhing his Hands," one of his moſt finiſhed productions, on two blocks engraved from a bas-relief of Govan. Bologna, in large folio; "Chriſt bearing the Croſs," after Al. Caſſolani, with the name of d'Andreani in Sienna, 1591, in folio; "The Entombing of Chriſt," a large folio print, dated 1591, from Giuſ. Scolari Vicentino, pittore excellente (Papillone mentions a Joſeph Scolari, an engraver on wood, to whom he attributes many prints in clair-obſcure). Another "Entombing of Chriſt," from Raphael da Reggio, a ſmall upright plate, half figures; "St. Peter preaching," marked with the name of Polidore, and the cypher of Andreani, 1608; "St. Sebaſtian, with a Biſhop, and the Virgin and Child, in Rays of Glory," marked Fredericus Barotius Urbinas, in large folio; an emblematical print, repreſenting the Chriſtian after his ſpiritual warfare in the preſent life, received as victorious into heaven, and crowned by Chriſt: it is ſigned Baptiſta Franco de Veniſe, and bears the cypher of Andreani, in large folio; a perſonification of human life, repreſented by a female figure aſſailed by the paſſions, ſigned Jac. Ligotus, inv. et Andreani 1585, Firenze, in large folio: there are different impreſſions of this plate, both with and without the chiaroſcuro. "The Rape of the Sabines," from a group by the ſculptor Govan. Bologna; three ſeveral views, dated 1584; another print of the ſame ſubject, from a bas-relief of the ſame maſter, on three blocks, dated 1585; "The Triumph of Julius Cæſar," from Andrea Mantegna, the original of which is at Hampton Court, it is cut on ten blocks of wood, including the title, and dated 1598; a large print of a ſcene in a play, intitled "Ortenſio," repreſented by the academicians, called Intronati, in the preſence of the grand duke Coſmo I. at Florence, from the deſign either of Marco Ricci, or Bart. Neroni.

Jacques, or Giacopo Palma, uſually called the younger, in contradiſtinction to his uncle Giacomo, who was a very eminent hiſtorical painter, was a native of Venice, born A.D. 1544, and died in the ſame city in the year 1628. Giacopo became the diſciple of Tintoretto, whoſe ſtyle he followed during the earlier part of his life, but he afterwards ſtudied with great care and attention the works of Titian and other great maſters, to complete his taſte. Palma has etched a number of free ſpirited plates in a ſlight ſtyle, to which he frequently ſigned his name at length, and ſometimes uſed the monogram of a palm-branch, croſſing diagonally the letter P, which will be found in our *Plate* II. of *Italian Monograms*.

The following are by him, and are his moſt eſteemed prints:—"Samſon and Dalilah," after Jac. Franco; and "Judith and Holofernes," both middling-ſized plates lengthways, marked with his name; "The Nativity," in ſmall 4to.; "A Holy Family, worſhipped by St. Jerome and St. Francis," half length; "St. John in the Deſert," in 4to.; "The beheading of St. John," the ſame ſize; "St. Jerome in Conference with a Pope," in 4to. very rare; "Pallas ſitting on a Trophy, holding a little figure of Victory in her Hand," in large 4to.; "Paying Tribute to Cæſar," the ſame; "The Woman taken in Adultery," the ſame; "Chriſt anſwering to the Phariſees, when they diſputed his Authority," the ſame; "Chriſt appearing to St. Thomas," half length figures; "Two Men in Tartarus," the ſame ſize; "An Eccleſiaſtic, and a naked Figure, with two Boys underneath," with the monogram of the artiſt; in 4to.

Dominico Pellegrino Tibaldi, who excelled in the three arts of painting, engraving, and architecture, was born at Bologna A.D. 1546. He was the ſon and pupil of Pellegrino, known by the name of Tibaldi da Bologna, after whoſe compoſitions he etched ſeveral ſpirited plates. The following ſhort liſt will probably be found to contain the beſt of Dominico's works on copper: "The Virgin of the Roſe," after a picture by Parmegiano, in the gallery of Dreſden, in folio; "A View of a Fountain at Bologna," from John de Bologna, ſigned Domin. Tibaldi. 1570, in large folio; "The Trinity," a grand compoſition, after Horace Samachini, in large folio; and a print repreſenting

“ Peace, laying the Inſtruments of War at the Feet of Jove.”

Camillo Procaccini was born at Bologna in the year 1546, and died at Milan in 1626. He very probably learned the principles of painting from his father Ercole Procaccini. Huber pronounces him the precurſor of the Caracci, and calls our attention to the ſublimity of his conceptions, and the grandeur of his taſte. He reſided chiefly at Milan, where he painted a great number of pictures, and died in that city at the advanced age of eighty. He amuſed himſelf much with etching, which he performed in a bold, maſterly ſtyle. The heads of his figures are often admirable, and the other extremities very finely marked. Among others, the following etchings are the production of his needle:—“ A Repoſe of the Holy Family,” in which Joſeph is repreſented in the front, a fore-ſhortened figure lying upon the ground, and leaning upon the ſaddle of the aſs, a middling-ſized plate, lengthways; another “ Holy Family,” in which Joſeph is repreſented giving an orange to the Infant Chriſt, a ſmall upright; another “ Repoſe,” where the Virgin is repreſented ſuckling the Infant Jeſus, in folio; “ St. Francis receiving the Stigmatics,” dated 1592, in folio; (Juſtin Sadler has engraved the ſame ſubject.) “ The Transfiguration of our Saviour,” a large upright plate, of which it is very difficult to find a good impreſſion.

Julius Cæſar Procaccini, the brother of Camillo, mentioned in the preceding article, was born at Bologna in the year 1548, and died at Milan in the year 1626. He learned the principles of painting of his father, but completed his ſtudies under the Caraccii. He excelled in hiſtorical compoſition, and his works are very much eſteemed. He etched for his occaſional amuſement, but we have never ſeen more than a ſingle ſmall plate by him, of which the ſubject is “ The Virgin and Child.”

Bernardino Paſſeri, or Paſſeri, was born at Rome ſome time about the year 1542, and reſided there moſt part of his life. In painting he poſſeſſed ſome talent, and appears to have imitated the Zuccheri, but the attitudes of his figures are, to a certain degree, forced and uneaſy. In the Abecedario he is called an univerſal engraver, but for what reaſon is not known, unleſs it means, that he occaſionally practiſed all the branches of that art which were then in vogue. It is certain that he has engraved a conſiderable number of prints, which, in general, he firſt etched, and afterwards finiſhed with the graver, in a bold, eaſy, and looſe ſtyle. His works prove him to have been a man of ability, but his drawing is not always correct, nor are the characters of his heads always beautiful, or well choſen. He often ſigned his name at length; and ſometimes uſed a monogram, which will be found among thoſe in *Plate* II. of the *Italian School.* The following are the names of a few of his works, which are by no means uncommon:—“ A Holy Family,” where the Virgin is repreſented with a Bohemian bonnet, dated 1583, in 4to.; “ The Life of St. Bruno,” repreſented on ſeveral middling-ſized upright plates, in 4to.; and a conſiderable number of Holy Families, Madonnas, and other pious ſubjects.

Ventura Salimbene, called Bevilaqua, was born at Sienna in the year 1555, and died in the ſame city in 1613. He learned the rudiments of his art of his father, Angelus Salimbene, who was the diſciple of F. Zucchero. He was half brother to Franceſco Vanni, whoſe ſtyle of painting he imitated; at Rome he chiefly worked in the library of the Vatican, and the church of St. John de Lateran. We have ſeveral ſlight etchings by this artiſt, in a bold, maſterly ſtyle, and among them the following, all from his own compoſitions:—“ The Marriage of the Virgin,” a ſmal upright plate, dated 1590; “ The Salutation of the Virgin,” in folio, 1591; a large folio plate of “ God appearing to the Virgin ſeated in the Clouds, ſurrounded by Angels;” “ St. Agnes,” a half-length figure in 4to.; “ The Baptiſm of our Saviour,” and “ Jeſus Chriſt appearing to St. Catherine of Sienna,” both in ſmall folio.

For an account of the merits of Antonio Tempeſta, as a painter, ſee the article Tempesta, Antonio. Fertile and vigorous in his invention, and various and verſatile in his artiſtical powers, he took up the pencil or the etching point with equal facility, and almoſt with equal ſucceſs. Though he delighted in cavalcades, battles, proceſſions, and ſuch other ſubjects as called forth his copious powers of compoſition, his prints are exceedingly numerous, amounting, according to Le Comte, to eighteen hundred, and according to Mariette, to no fewer than two thouſand!

Tempeſta’s ſtyle of etching, in perfect uniſon with the general character of his art, was bold and free; the lights are kept broad on his ſingle figures; his figures are often grouped with grandeur, and he poſſeſſes a certain ardent livelineſs of expreſſion, both in his human figures and animals.

From this aggregate of his merits, ſome deductions muſt, however, be made. The muſcles of his horſes, which frequently occur in his battles and hunting pieces, are generally overcharged; his draperies are not elegantly drawn; his lights and ſhades are not collected into broad maſſes, ſo as to give unity of effect to his chiaroſcuro, and his etchings are often coarſely corroded, ſo as to deſtroy the clearneſs and value of the middle tints.

Tempeſta did not always mark his prints with the ſame cypher. We have collected his various marks, and they will be found in our *Plate* II. of the monograms, &c. of the *Italian Engravers.* The following liſt is ſelected from the beſt catalogues of his works:—“ Our Saviour crucified between the two Thieves,” in large folio, very rare; a ſet of middling-ſized plates, lengthways, the ſubjects of which are taken from the Old Teſtament, and commonly known under the name of “ Tempeſta’s Bible;” a ſet of a hundred and fifty prints, from “ Ovid’s Metamorphoſis,” in 4to.; a folio print of “ Diana and Actæon;” “ The Entry of Alexander into Babylon,” of the ſame ſize; a ſet of twenty-four pieces, entitled, “ Vita S. Antonii Abbatis, &c.” in 4to.; “ The Labours of Hercules,” in thirteen plates of octavo dimenſions, compriſing a frontiſpiece and dedication; “ The Four Ages of the World,” repreſented by the manner of living at thoſe different periods; four hunting pieces, namely, a ſtag hunt, a hare hunt, a wolf hunt, and a wild-boar hunt, in octavo; another ſet of chaces; another ſet of four of field ſports; two ſubjects of battles between the armies of the ancients, in folio; two more, of modern battles; another battle, dedicated to the duke of Gravina, dated 1600; another ſet of ſix battles, with a frontiſpiece, inſcribed “ Facunda quam ſit—oliens ex. Tempeſtus f. de Wit ex.;” all of folio dimenſions.

Of the illuſtrious family of the Caracci, we have already written as painters, ſee the articles Caracci Lodovico, Agostino, and Annibal. It remains to add ſome account of their merits as engravers, and to point out their beſt productions in this art to the notice of connoiſſeurs and collectors.

Lodovico has left us a few ſmall prints from his own compoſitions. His practice was to etch his deſigns, and employ the graver in giving them a few finiſhing touches: hence his plates are ſlight, free, and maſterly; with the extremities of his figures tolerably well defined, and ſtill bette

underſtood

underſtood ; as is ſufficiently obvious to an intelligent eye. He generally marked his prints, of which we ſelect the following as the moſt worthy of notice, with the initials of his name, but not combined in a cypher. “ A Madonna and Child, ſurrounded by Angels,” in 4to.; “ A Holy Family, wherein St. Joſeph is leaning his Head upon his Hand ;” “ The Holy Virgin ſuckling the Infant Chriſt ;” “ A Holy Family, in which the Virgin Mary is reading a Book,” all in ſmall folio ; “ Samſon killing the Lion,” in 4to. ; Frontiſpiece to the poems of Ceſar Rinaldi, and a folio print of the armorial bearings of the family of Bonfigliovoli, in which the figures of Hercules and Mercury are allegorically introduced.

Agoſtino Caracci was the ſon of a tailor of Bologna, who, deſirous of educating his family in a ſuperior manner, intended Agoſtino for a ſcholar, but a ſtrong inclination for the purſuits of the fine arts becoming very manifeſt, the father was induced to alter his deſign, and placed his ſon under a goldſmith : here he learned the rudiments of engraving, for the Bologneſe goldſmiths of that time were accuſtomed to ornament their productions with engraving, which was often executed with a degree of taſte and beauty correſponding with the general exiſting ſtate of art.

From this purſuit, however, the great ſucceſs of his younger brother Annibal, as a painter, appears to have attracted him for a time, and he placed himſelf for inſtruction in that art under Fontana, then under Paſſeroti, and finally under his couſin Ludovico.

Under theſe maſters he attained a degree of excellence in the art of painting, of which we have already ſpoken, but was afterwards induced, from local circumſtances, with which we are unacquainted, to reſume the graver, and for further improvement went to ſtudy in the ſchool of Cornelius Cort.

The profeſſor Fuſeli ſays, it was “ *a ſingular modeſty* which prompted him rather to propagate the fame of others by his graver, than by ſteady exertion to rely on his own powers for perpetuity of name :” but he who has produced the engravings which we ſhall enumerate, even if he had done no more, muſt certainly have poſſeſſed ſome ſteadineſs of exertion, could ſcarcely, indeed, have been “ leſs aſſiduous than his brother,” and might ſurely rely on the art which he did practiſe ſo ſucceſsfully, for perpetuity of name.

The truth has been, that his great merit as an engraver remains unimpaired by time, and unimpeached by poſterity, while his picture of “ The Three Nymphs in the Garden Scene of St. Michael in Boſco,” was nearly “ in a ſtate of evaneſcence,” when M. Fuſeli was in Italy.

Strutt ſays that Agoſtino imitated the ſtyle of Cort “ ſo exactly, with reſpect to the mechanical part of it, that were it not for the great ſuperiority which appears in the drawing of the prints of Caracci, it would be difficult to diſtinguiſh them from each other : a ſtriking inſtance of which may be ſeen in “ The Holy Family with St. Jerome,” from Correggio, which was engraved by both artiſts.”

Agoſtino Caracci worked entirely with the graver, in a bold free ſtyle ; and his drawing of the naked parts of the figure are admirable. The heads are remarkably fine ; and the extremities are marked in the moſt accurate and maſterly manner. His draperies are frequently ſtiff, and croſſed with a ſquare ſecond ſtroke, which gives them an unpleaſing effect. But, perhaps, his greateſt defect is the prevalent fault of the age in which he lived, namely, the little attention paid to the chiaroſcuro. The lights are too much ſcattered, and left untinted, as well upon the diſtances, as upon the fore-ground and principal objects ; which not only deſtroys the harmony of the effect, but gives a ſlight unfiniſhed appearance even to the neateſt engraving. Baſan ſpeaks of him in theſe words : “ This excellent artiſt, equally verſed in the ſciences and fine arts, treated his engravings in ſo perfect a ſtyle, that one knows not which to admire moſt, the correctneſs of his drawing, or the beauty of the performance. All young artiſts ought carefully to obſerve, with what facility and perfection he expreſſed the extremities of his figures, and with what art he executed even landſcape with the graver.”

The engravings of Agoſtino are numerous, though their dimenſions, generally ſpeaking, are large. The following liſt will be found to contain thoſe of moſt merit and importance. His prints are marked either with the initial letters, or ſome contraction of his names, but not combined in a cypher.

Portraits and Hiſtorical Prints from his own Compoſitions.— Anthony Caracci, the father of Agoſtino and Annibal, a ſmall print, but very rare ; his own portrait ; Henry IV. of France, at the age of thirty-ſix ; the emperor Auguſtus, en medallion, with a reverſe ; buſt of Coſmo I., with ornamental figures ; a fine female head, cited by Malvaſia ; portrait of a ducheſs with a pearl necklace ; portraits of Jean Tomaſo Coſtanzo, the princeſs Chriſtiana of Lorraine, Ulyſſes Aldrovandus, Marc Antonio Raimondi, Titiano Vecelli, Anthony Carrachi, as St. Joſeph ; “ Adam receiving the fatal Apple ;” “ The Virgin and Child ;” “ The Virgin ſuckling the Infant Jeſus ;” “ A Repoſo ;” “ The Virgin in the Clouds, with the Infant Jeſus,” was engraved by Marc Antonio, after Raphael ; but Auguſtino, having got the plate into his poſſeſſion, added two fine heads of Cherubs ; “ The Virgin in Heaven, giving the Scapulary to a Saint,” a very fine engraving ; “ The Virgin ſitting on a Step near St. Joſeph and an Angel, accompanied by the Infant Chriſt and St. John,” a large folio print, very rare ; “ The good Samaritan,” in folio. (The impreſſions of this plate, without letters, are very rare ; and thoſe with the name of Bertelli are re-touched.) “ The myſterious Crucifix,” where a female figure repreſents Chriſtianity and another Judaiſm, in folio ; “ The Reſurrection of Jeſus Chriſt,” in folio ; “ Le Nome di Dio,” repreſenting the pope and ſenate of Venice ſupplicating the Virgin and ſaints to intercede for them, in an oval, ſurrounded with acceſſories, and ſubſcribed “ Luc. Bertelli formis,” but without the name of Auguſtino, who certainly engraved it, in large folio ; “ The Pea-hen, with Diana en Medallion ;” beneath is a landſcape, with the fable of Salmacis and Hermaphrodite ; and lower down in the plate are three ovals, with the diſpute between Neptune and Minerva, the Three Graces, and a buſt of Minerva ; theſe are all on one plate, in large folio ; the frontiſpiece to the book of Alde Manuce, entitled “ Vita di Coſimo de Medicis,” in folio. Another frontiſpiece, after Antonio Campi, for the book, entitled “ Cremona Fideliſſima,” in fol. (This is a very rare book, conſiſting of thirty-three portraits, engraved by Auguſtino.) Nine plates, from Taſſo's “ Jeruſalem Delivered,” publiſhed A. D. 1590. The reſt of the plates for this work were engraved by Giacomo Franco ; “ St. Francis receiving the Stigmatics,” a large folio print ; “ The Girdle of St. Francis,” a grand compoſition, repreſenting a ſaint diſtributing the girdle of his order to different Chriſtian ſects ; a large folio print of “ St. Jerome kneeling at the Entrance of his Cave.” There are impreſſions of this plate when it was about three parts finiſhed, which are extremely rare ; the remaining part is a mere ſketch, marked with a very free touch. An inſpection of this print ſhews with what eaſe and vigour Auguſtino managed his tool. There are impreſſions of the ſame plate, quite finiſhed, by F. Villamena, his pupil. Two landſcapes, in folio, with figures; “ Cupid conquering Pan,” inſcribed “ Omnia vincit amor, 1599;” “ Eternity in the Clouds, ſurrounded by female Figures,” in folio; “ Perſeus in the Clouds fighting with the Sea-monſter:” both this and the former one are theatrical ſcenes.

The following are from the Pictures of various other Maſters. —“ A Child blowing Bubbles,” from Goltzius, very rare, in folio; “ Jacob keeping the Flock of Rachael,” 1581, after Denys Calvart; “ Judith,” a half figure, after Laur. Sabbatius, both of the folio ſize; “ The young Tobias conducted by an Angel,” from Raphael da Riggio, (it is miſtakenly marked “ Raphael d'Urbain”), in large folio; “ The Preſentation in the Temple,” ſigned Horace Samacchini, pinx. in large folio; “ The Virgin and Child giving the Keys to St. Peter, accompanied by other Saints;” Id. pinx. in folio; “ The Adoration of the Kings,” ſigned Balthazar, Peruzzi pinx. very large, engraved on ſeven plates; the ſame ſubject repeated, where one of the kings is kiſſing the feet of the Infant Chriſt. There are impreſſions of this, both with and without the name of the painter, Marco del Moro; “ The Virgin and Child, with Mary Magdalene, St. Jerome, and an Angel holding a Book,” from Correggio, in large folio. This picture, known under the name of the Day of Correggio, which was in the academy at Parma, is at preſent in the muſeum at Paris. “ An Ecce Homo,” accompanied by the Virgin and other half figures, in large folio, from the ſame maſter; “ Our Saviour ſhewn to the People,” half figures, after Veſp. Strada; “ The Body of our Saviour, ſupported by an Angel,” half figures, the ſame ſize; “ The Crucifixion, or Mount Calvary,” in three very large plates, from Tintoret; “ The Body of our Saviour on the Knees of his Mother,” from a marble group by Michael Angelo, in large folio; “ The Nativity,” from Andrea del Sarto; “ The Virgin crowned in Heaven by the Trinity,” from Aug. Moſtaert, in folio; “ A Holy Family,” from Fred. Barroccio. Another “ Holy Family, with St. John preſenting a Scroll,” with the words “ Ecce agnus Dei,” from Raphael, in folio. Another “ Holy Family, with St. Michael,” from Laur. Sabbatini, in folio; “ The Virgin ſitting in a Creſcent with the Holy Infant,” from the ſame maſter, in folio. Another “ Holy Family,” placed high in the print, with St. Anthony and St. Catherine lower down, from Paul Veroneſe, in large folio; “ The Holy Virgin opening her Cloak to protect Two Monks,” in folio. Another large folio print of “ The Marriage of St. Catherine,” a grand compoſition. A very large upright print of “ The Martyrdom of St. Juſtinian,” on two plates, all from Paul Veroneſe; “ The Holy Trinity, in a radiance of Glory, between Two Columns,” from Titian, in large folio; “ St. Paul reſtoring a Saint to Life,” from Antonio Campi, inſcribed “ D. Pauli Miraculum in Neronis palatio factum;” “ The Virgin and Child ſurrounded by Angels,” from Julius Campi; “ The Virgin repoſing, with the Infant Jeſus and St. Joſeph,” from Berin Paſſerus, in folio; “ The Virgin,” a half figure, from Giacomo Francia; “ St. Sebaſtian,” in folio, from Françio Francia; “ The Virgin ſuckling the Infant Jeſus,” from Jac. Ligotius, in folio; “ St. Jerome,” half length, from Vann. in folio; “ St. Jerome contemplating the Virgin in Heaven,” in large folio, from Tintoret; “ The Temptation of St. Antony,” in large folio, a print which, being without the name of Auguſtino, has been miſtakenly attributed to C. Cort.; “ Mercury, and the Three Graces,” in ſmall folio; “ Wiſdom, accompanied by Peace, purſuing the God of War,” the ſame ſize, both from Tintoret; and “ Eneas ſaving his Father from the Deſtruction of Troy,” a very large upright plate, from Barroccio.

The etchings of Annibal Caracci, the younger brother of Agoſtino, and author of the Farneſe Gallery, are performed with all the firm confidence and fire of a maſter. They are held in high and deſerved eſtimation among artiſts and connoiſſeurs, and no collection of the productions of the Italian School ſhould be without good impreſſions of the following:—“ Chriſt crowned with Thorns,” from a ſimple and admirable compoſition of his own, wherein the elevated dignity, yet meek ſubmiſſion of the Son of God, is contraſted to the brutality of the ſcoffers, in a moſt affecting and wonderful manner. In the opinion of Strutt, and of the preſent writer, this is one of the very fineſt etchings of Annibal Caracci. It has been often copied, and in ſome inſtances tolerably well; the original is inſcribed “ A.C. inv. et fec. 1606.” “ A dead Chriſt on the Lap of the Holy Virgin,” commonly known among collectors by the name of the “ Chriſt du Capprarole;” “ The Adoration of the Shepherds,” called by the print dealers “ The little Crib,” from the circumſtance of one of the ſhepherds introduced, being leaning againſt a manger, nearly in the middle of the compoſition: this alſo has been copied ſeveral times. The above are both of 4to. dimenſions.

Of the ſame ſize are “ The Adoration of the Magi;” and “ Chriſt and the Woman of Samaria.” “ A Holy Family,” where Joſeph is ſeated, leaning againſt a column, holding a book, is a ſmall plate lengthways; “ The Virgin holding the Infant Chriſt and giving Drink to St. John,” is diſtinguiſhed by the name of “ The Virgin of the Porringer,” another ſmall plate lengthways; “ The Deſcent of the Holy Ghoſt,” a ſmall upright plate, nearly ſquare; “ Suſanna and the Elders,” a middling-ſized plate, nearly ſquare; “ Jupiter and Antiope,” a ſmall plate lengthways, dated 1592; “ Silenus and two Satyrs,” a ſmall circular plate, of about eight inches and a half diameter, the border of which is ornamented with vine branches and grapes: this is commonly called the “ Diſh” of Annibal Caracci, having been engraved for the bottom of a ſalver, belonging to cardinal Farneſe; “ The Virgin ſupporting the Infant Jeſus, who is aſleep,” in 4to.; “ The Virgin of the Nightingale,” where the Infant Chriſt is taking a bird from the hands of St. John, of the ſame ſize; “ St. Jerome of the Spectacles,” a half figure; a ſmall plate of “ St. Francis ſitting, holding a Skull on his Knees and a Crucifix in his Hand;” another, in quarto, of “ St. Francis kneeling at the Foot of a Rock, with a Diſciple before him;” “ Apollo playing the Lyre, with Pan, or Marſyas beſide him, biting his Fingers,” a very rare print, in octavo; “ An old Man ſpeaking to two other Figures,” of the ſame ſize: “ Venus aſleep, with Cupid obſerved by a Satyr,” in quarto; another “ Venus aſleep, with Cupid and a Satyr,” of the ſame ſize; “ The Triumph of Bacchus,” in quarto: of this ſubject Annibal engraved a duplicate plate, as is ſaid, with the view of inſtructing Lanfranc in the art of etching. “ Acis and Galatea watched by a Satyr,” in folio.

Franceſco Caracci, commonly termed Franceſchini, was the nephew of Agoſtino and Annibal, and was inſtructed in the arts of deſign by Lodovico. With ſuch opportunities and ſtrong natural talents, he in a ſhort time attained an extraordinary knowledge of the human figure, which he drew ſo correctly, as to aſtoniſh his learned relatives, and Strutt thinks he might have attained a reputation equal, if not ſuperior, to any of the Caracci: but his unfortunate propenſities to debauchery nipped all theſe fair promiſes in the bud. He died in an hoſpital at Rome, A.D. 1662, aged only 28 years.

Franceſchini etched with ability ſome few prints from the compoſitions of his uncle Annibal, among which are the following. He uſually marked his work with the monogram, which will be found in our *Plate* II. of the *Italian Maſters* :—"The Madonna and Child ſeated on a Cloud ;" "St. Charles Boromius kneeling before a Table, contemplating a heavenly Light ;" two plates of "Angels teaching the Leſſon of Mortality," of which our artiſt himſelf was ſo heedleſs ; a ſet of four plates of illuſtrious women of antiquity : namely, "Semiramis," "Lucretia," "Artemiſia," and "Portia." Theſe latter are after Lodovico Caracci, and are very rare, and all his prints are of ſmall dimenſions.

Of that diſtinguiſhed engraver Cherubino Alberti, who was living at the period now under our review, we have already detailed the biography, and deſcanted on the leading traits of his excellence, under the article Alberti Cherubino. His monogram will be found in our *Plate* II. of thoſe of the *Italian School ;* and we are now enabled to render our ſelect liſt of his performances ſomewhat more copious, by the addition of the following :—the Portraits of Pope Gregory XIII. in an oval, with acceſſory ornaments ; Pope Urban VII. companion to the above ; Henry IV. of France, alſo in an oval, with accompaniments ; and Pietro Angelo Bargeo ; all of folio dimenſions, and from pictures by Cherubino himſelf.

Hiſtorical Subjects from his own Compoſitions :—"Judith, with the Head of Holofernes, and a Sword," in folio ; "The Nativity," a grand compoſition, dedicated to Pope Clement XII. inſcribed "En Deus Omnipotens," &c. both in folio, and marked with his cypher ;" "The Flight into Egypt," where the aſs is led by an angel, accompanied by St. Joſeph and Elizabeth, in large folio ; another folio print of "The Virgin and Child with St. Joſeph," ſigned with Cherubino's cypher ; "The Body of our Saviour, carried through the Clouds by two Angels," inſcribed "Magnum pietatis opus," &c. in folio ; "The Virgin and Child in the Clouds, ſurrounded by Cherubims' Heads, and two Angels ſtrewing Flowers," entitled "Regina Cœli," in folio ; another folio plate, of "St. Catherine of Sienna ſtigmatized, and ſupported by two Angels," 1574, marked with the artiſt's cypher ; "St. Chriſtiana and St. Francis ſtigmatized, accompanied by two Angels," 1599 ; "St. Charles in the Clouds ſurrounded by Angels, proſtrating himſelf before the Virgin and Child," 1612, all of folio dimenſions ; ſix ſubjects for ceilings, of children, after the pictures by Alberti, painted at Tivoli ; ſix genii in the air, dedicated to Cardinal Viſconti ; the firſt is inſcribed "Ex picturis, quas Cherubinus Albertus in ejus Villa Tuſculana pinxit, has ipſemet incidit, 1607," in large quarto.

Hiſtorical Subjects from various other Maſters :—Standing figure of "Suſanna leaning againſt a Pedeſtal," on which is written, S. Suſanna Vir. & Mart. ; lower down, Alexander Albertus inv. dedicated to Cardinal Ruſtici, in large folio ; "Our Saviour on the Croſs," to the left is the Virgin, to the right St. John with extended arms, from Michael Angelo, in folio ; a large folio print of "St. Jerome ſitting meditating on a Croſs," from the ſame maſter, engraved at Rome, A.D. 1575 ; another in folio, of "St. Andrew bearing a Croſs," engraved in 1580, and taken from the Laſt Judgment of Michael Angelo ; two other figures, in folio, from the Laſt Judgment, one inſcribed "Nuda Veritas," the other, "Petit ad Æthera ;" theſe are very fine engravings, and dated 1591 ; the figure of Charon, accompanied by two others, and ſome heads, from the ſame Laſt Judgment, engraved A.D. 1575, in folio ; "Prometheus torn by the Vulture," painted for an angle of the Siſtine Chapel, in folio, engraved A.D. 1580 ; a group of four figures, namely, "The Body of Our Saviour ;" "The Virgin ;" "Nicodemus ;" and "Mary Magdalen ;" in folio. The original ſculpture by Michael Angelo, from which this engraving was made, was taken to Florence, and placed behind the altar of the cathedral, with the following inſcription : "Poſtremum Michaelis Bonarotæ opus, quamvis ab artifice ob vitium marmoris neglectum, eximium tamen artis canon. Coſmus III. Magnus Dux Etruriæ Romæ jam erectum hic. P. I. anno MDCCXXII." Three prints repreſenting "The Creation of Adam and Eve ;" "Adam and Eve chaſed out of Paradiſe ;" and "Adam and Eve ſubjected to Labour," Romæ, Polidorus de Caravag. invent. ; a large frieze, of "The Death of the Children of Niobe," in five plates ; another frieze, of "The Rape of the Sabines," with a Latin inſcription ; "The Triumph of Camillus," in the antique taſte ; "Pluto," a figure holding a flambeau ; "Fortune," with her left foot on a wheel ; "The Preſentation in the Temple," from Raphael : it was publiſhed after the death of Alberti, in folio ; "The Reſurrection of Chriſt," a grand compoſition, with an angel ſitting before the door of the ſepulchre, dated 1628, in folio ; "Jeſus on the Mount of Olives," where an angel preſents him with a chalice, dated 1574, and publiſhed in 1628, in folio, from Roſſo ; this, as well as the laſt, was publiſhed after the death of our engraver. "A Holy Family," in large folio, after Raphael, engraved in 1582 ; a folio print of "Jupiter careſſing Ganymede," from the Vatican, by Raphael ; two more from the Vatican, on the ſame plate, of "The three Graces ;" and "Venus quitting Juno and Ceres," 1582 ; "The Adoration of the Magi," a grand compoſition, after Roſſo, dated 1574 ; "The Transfiguration," marked with Alberti's monogram, from the ſame maſter, 1574 ; "St. Stephen ſtoned," an architectural deſign for a grand tabernacle, on two plates, Rome 1575, in folio, all from Roſſo ; "The Baptiſm of our Saviour," after Andrea del Sarto ; "The Miracle of St. Philip Benizzio," where thoſe who had deſpiſed his exhortations were ſtruck dead with lightning, from a picture by Andrea del Sarto, 1582 ; a folio print of "The Guardian Angel conducting the youthful Tobias," from Pellegrino Tibaldi, 1575 ; "Our Saviour in the Garden of Olives, with his three Diſciples," engraved by Perin del Vaga, and Ch. Alberti, in folio ; "The Nativity, or the Adoration of the Shepherds ;" over head is a glory of angels, inſcribed "Glia in Eccis," in large folio, on two plates, from Thadeus Zucchero ; another "Holy Family," where the Virgin holds the Infant on a cradle, from the ſame maſter ; "The Flagellation," from a picture by T. Zucchero, in the church of the Conſolation at Rome, in folio, dated 1575 ; "The Converſion of St. Paul," a grand folio print, from the ſame maſter, dated 1573 ; "The Body of our Saviour in the Arms of God the Father, ſurrounded by Angels, with the Inſtruments of the Paſſion," from the ſame ; "The Aſſumption of the Virgin," engraved in 1577, from T. Zucchero, and dedicated to pope Theani, in large folio ; another Aſſumption, a large print from T. Zucchero, engraved in 1571 ; "The Virgin crowned in Heaven," from the ſame maſter, engraved A.D. 1572.

We have already treated of the biography and merits of Lodovico Cardi, ſurnamed Civoli, both as an engraver and painter. (See the article Cardi Lodovico.) His monogram will be found in our *Plate* II. of thoſe of the *Italian School.*

Chriſtopher Lederer was born at Nuremberg in the year 1560. He travelled to Italy in his youth, for the ſake of ſtudying the arts to advantage; and here, for ſome reaſon which has not tranſpired, he changed his ſurname for that of Coriolano, or Coriolanus. He reſided at Venice for ſome years, where, according to Vaſari, he engraved on wood a ſet of portraits of celebrated artiſts, a work which other writers have ſtill more miſtakenly aſcribed to his ſon.

Now as theſe portraits firſt appeared in the year 1568, if Chriſtopher was born in 1560, as Huber reports, and Bartholomew not until 1590, they could not have been engraven by either of the Coriolani. Again, he is ſaid to have engraven for the anatomical work of Veſalius, of which the drawings were ſupplied by Titian, but as this celebrated book firſt appeared in 1542, Lederer's blocks muſt have been for ſome ſubſequent edition, if he cut them at all.

It appears much more certain that he engraved the figures for Ulyſſes Aldrovandini's work on natural hiſtory, and for another book, entitled "Ars Gymnaſtica," &c.

Bartolomeo Coriolano was the ſon of Chriſtopher, and was born at Bologna in the year 1590. He learned the rudiments of art in his father's houſe, but finiſhed his ſtudies in the Bologneſe academy.

In return for the dedication to pope Urban VIII. of a capital work which he engraved on wood, after the Caracci, Guido, and other great maſters, that pontiff beſtowed on him a penſion, and the order of knighthood. According to Papillon, our artiſt pretended to be a deſcendant of Caius Martius Coriolanus, the great Roman general, but this is moſt likely a mere joke, fabricated on the occaſion of his military, or equeſtrian title.

He likewiſe engraved in clair-obſcure, and his productions in that ſtyle are very much eſteemed by connoiſſeurs. He had a good taſte in deſign, his heads are finely characterized; and the other extremities of his figures are very well marked. In general he uſed no more than two blocks of wood; on the firſt he cut not only the outlines, but the darker ſhadows in imitation of hatching with a pen; the ſecond ſerved for the half tints; and with theſe two blocks, judiciouſly managed, he produced a pleaſing effect. He ſigned many of his prints with his name at length, and the addition of the word Eques, which is known to be ſynonimous with knight. The following are among his moſt eſteemed productions: "St. Jerome meditating before a Crucifix," a ſmall upright print from Guido; this is engraved on three blocks of wood, and inſcribed "Barthol. Coriolanus, Eques, ſculpſit, Bonon. 1637;" "Herodias with the Head of St. John," alſo in clair-obſcure, and from Guido; "The Virgin and Infant Jeſus, aſleep under Drapery," on wood, from Guido; the ſame ſubject, in clair-obſcure, very finely executed, both in 4to. and marked Barthol. fec. 1630; another "Virgin and ſleeping Chriſt," from F. Vanni, in clair-obſcure, not marked, in large 4to.; "Peace and Plenty," from Guido; "A Sybil ſitting, holding Tablets," both in 4to.; "The Fall of the Giants," a large upright print, on four ſeparate ſheets which paſte together, in clair-obſcure, "The Seven Wiſe Men tranſported to Bologna," in large folio.

Thereſia Maria Coriolano, was the daughter of this artiſt, and learned engraving of her father, and painting of Elizabeth Sirani. We only know of a ſingle etching by her, of "A Virgin and Child," half figures.

Giovanni, or Jean Batiſta Coriolano, was brother to Bartholomew, and was born in the year 1596, in Bologna; where he became the ſcholar of Valiſco, a painter of ſome eminence.

As a painter, Batiſta never acquired any great degree of reputation, but he engraved both on copper and wood, his works on the latter material being however greatly ſuperior to his engravings on copper. The following may be reckoned among his beſt productions: a portrait of Vincent Gualdi; another of Fortunatus Licetus; another of Joannes Cottinius, Patricius Verienſis, Coriolano, fe. all of quarto dimenſions; the ſtatue of the Virgin in a palm-tree, commonly ſtyled "Our Lady of the Palm," before which is a ſmall altar: "The Miraculous Image of the Virgin," from Guido; "Chriſt crowned with Thorns," from Lodovico Caracci; "A ſleeping Cupid," in chiaroſcuro, very rare, after Guido; a triumphal arch in honour of Louis XIII. in folio; "Paul Macii Emblemata," being a ſet of eighty-three prints, of which twenty-ſeven are by Coriolano, and the reſt by O. Gatti, and A. Pariſini.

Giovanni Luigi Valeſio, was born at Bologna in 1561. There were two other engravers of this name, who lived ſome time about the ſame period, and probably belonged to the ſame family; but as their productions have nothing remarkable to recommend them, we will paſs them over in ſilence. Giovanni frequented the Bologneſe academy, and has engraved ſeveral things in a good taſte. Moſt of his prints conſiſt of allegorical and emblematical deſigns, frontiſpieces for books, and other ornamental plates; ſome of which he marked with a monogram, which will be found in our *Plate* II. of thoſe of the *Italian Engravers*. The following are among his moſt eſteemed productions: "The Virgin with the Infant Chriſt ſeated on her Lap," a ſmall upright plate; "Venus threatening Cupid," and "Venus chaſtiſing Cupid," its companion, two ſmall upright plates; "Hymen with two Lions at his Feet," and "A Group of Genii," from Lodovico Caracci, in folio.

Jean Frederic, the ſon of Matthew Greuter, of Straſbourg, was born at Rome ſome time about this period. Our countryman, Strutt, has entered into rather a lengthened argument with the foreign writers reſpecting the date of Jean Frederic's birth, of which his merits as an artiſt do not appear to render him worthy. What does it ſignify when or where men are born, who are poſſeſſed of no greater talent or taſte than this engraver? or whether or not there was a Frederic and a Jean Frederic alſo?

The ſon of Matthew Greuter, of whom we have given ſome account in our GERMAN *School of Engraving*, reſided at Rome, being educated to the profeſſion of engraving by his father. Here he engraved a conſiderable number of plates with commendable induſtry, working with the graver only: but he neither drew well, nor poſſeſſed feeling for art that might in any degree ſupply the place of drawing; yet his prints, of which we ſhall only mention a few, are ſometimes ſought after by the curious. "Hercules in the Garden of the Heſperides," from Pietro da Cortona; "The Forge of Vulcan," after Lanfranc; and "A Battle," from Tempeſta, both in large folio. "The Death of St. Cecilia," after Dominichino, a large plate, nearly ſquare. An emblematical ſubject relative to the progreſs of Chriſtianity, a large folio print, from Romanelli; and "A Madonna and Child, with St. Francis kneeling," from a compoſition by himſelf, arched at the top, of folio dimenſions, and dated 1623.

He alſo engraved ſeveral portraits, and other ſubjects from Guido, Vouet, Stella, And. de Ancone, and other maſters.

Franceſco Vanni, a very celebrated hiſtorical painter, was born at Sienna A.D. 1563, and died in the ſame city in 1610. He was firſt the diſciple of Salimbini, afterwards of Paſſarotti, and at laſt of Giovanni de Vecchia; though in preference to all theſe, he adopted the ſtyle of Fred. Baroccio. We have four ſmall etchings by him: the ſpirit, beauty, and correctneſs of drawing that appear in thoſe prints, makes it to be regretted that he etched ſo little. The ſubjects of theſe etchings are as follow: "The Virgin contemplating the ſleeping Chriſt;" "St. Catherine of Sienna receiving the ſtigmata, or Brand;" "St. Francis receiving the Stigmata;" and "The Extatic Viſion of St. Francis," the ſaint is a half figure, and an angel appears above playing on the violin. Huber ſays that the beauty which is diſcoverable in this print cannot be too much admired. Agoſtino Caracci engraved from the ſame deſign, with ſome variations.

Giovanni Maggi, or Magius, was born at Rome in the year 1566, and is better known as an engraver than as a painter; we have by him many ſlight etchings, which are not worthy of any very great commendation. In 1618, he publiſhed a collection of all the principal fountains in Rome, which he engraved in conjunction with Domenico Paraſachi. He undertook to engrave, on a very large ſcale, the plan of Rome, with all the ſtreets and principal buildings, &c. but wanting money, the enterprize was never performed by him. We have by him, the portrait of a cardinal, as large as life; a landſcape, with figures, ruins, &c. inſcribed "J. Maius, v. et fec. 1595;" and "Figura della Vita Humana, Joh. Maius fec. 1600," in large folio.

Franceſco Villamena was born at Aſſiſſi, a city of Italy, in 1566, and died at Rome in 1626. He went to Rome under the pontificate of pope Sixtus V. and ſtudied the beſt pictures and ſtatues there. He ſtudied engraving under Cornelius Cort and his ſcholar Agoſtino Caracci, with whom he was contemporary. Villamena drew with conſiderable ability; he engraved in a bold open ſtyle, and produced a clear but not powerful effect; his lights, though broad, are too much ſpread over the whole engraving, which makes his prints appear unfiniſhed. But this defect was common to the artiſts of that age, and theſe faults in the prints of Villamena, are amply compenſated by the beauties with which they abound, particularly with regard to the expreſſion of the heads, and the excellency of the drawing. The extremities of his figures are alſo very finely marked. Some of the engravings of this artiſt are performed almoſt entirely with ſingle ſtrokes, without any croſs hatchings laid over them; and it was perhaps from them that Mellan originally took the hint, which afterwards became the marked peculiarity of his ſtyle. The number of Villamena's prints is very conſiderable: M. Mariette mentions three hundred and ſixty; and he marked them either with his name, initials, or monograms, which will be found in our *Plate* II. of thoſe of the *Italian School*, we ſhall mention the following, from his own deſigns; a portrait of cardinal Cæſar Baronius Soranus, in folio; and four other portraits of men of rank; "St. Thereſia in her Cell writing, under the Inſpiration of the Holy Ghoſt," in folio; "Mary Magdalen penitent in the Deſert, crowned by an Angel," in 4to.; "St. Francis praying before a Crucifix," in folio; a ſet of ſix groteſque little figures, one of which is a beggar, accompanied by two children; a ſet of five ſaints, three of which are from his own deſign, and the two others from Ferrau Franzoni, in ſmall folio; "St. James, appearing in the Air, to the Army of Ferdinand," a very grand compoſition; "A Man, angered by a Crowd of People, fighting in his own Defence;" a large print lengthways, commonly called The Boxers; a middling-ſized plate, in which is repreſented John Alto, the antiquary, ſtanding in one of the ſtreets of Rome. The following prints are

From various other Maſters.—"Moſes exalting the Brazen Serpent," from Ferrau Franzoni; "A Holy Family, with St. John, Elizabeth, and St. Ann," a middling-ſized upright plate from Raphael, dated 1602. Villamena repeated this ſubject, and dated the ſecond print 1611. "The Salutation of the Virgin," a large upright plate, from M. Arconio; "The Virgin and Infant Jeſus worſhipped by St. Francis;" "St. Bruno, with his Companions, doing Penance in the Deſert," a large plate lengthways from Lanfranco; "Chriſt taken from the Croſs;" a large folio plate, arched at the top, from Baroccio; another "Annunciation of the Virgin," a grand compoſition from Hipp. Andreaſius, in large folio; "The Preſentation in the Temple;" a midling-ſized plate lengthways, from Paulo Veroneſe; "St. Bernard, and the Virgin in the Clouds," after F. Vanni; "Alexander at the Battle of Arbella," from Ant. Tempeſta; a large plate, lengthways, repreſenting "Hercules holding the Globe, with the armorial bearings of Cardinal Arrigoni," from Albano; another ſubject of the ſame kind with the arms of Cardinal Barberini; the ſame ſubject with the arms of Spain, all which are of large folio dimenſions; the bible of Raphael in twenty plates, fifteen from the Old Teſtament, and five from the New, intitled "La ſacra Geneſi figurata da Rafaele, intagliata da Franceſco Villamena, dedicata al Cardinal Aldobrandino, Rom. 1626."

Leonardo Norſini, who aſſumed the name of Paraſole, from its being the family name of his wife, was born at Rome in the year 1570, and died in the ſame city, at the age of ſixty. He was an engraver on wood of ſome merit, and was much employed by A. Tempeſta. At the command of pope Sixtus V. he engraved the plants, &c. for the herbal of Caſtor Durante, the phyſician of that pontiff.

The figures in Norſini's engravings, after Tempeſta, are correctly drawn, and executed in a finiſhed ſtyle, for that mode of art.

His ſon, Bernadino Norſini, likewiſe engraved on wood; he frequented the ſchool of Joſephine, and began to make ſome progreſs in painting, when he died at an early age.

Iſabella Paraſole, the wife of Leonardo, was a woman of great ingenuity, and compoſed a book of patterns for lace and embroidery, of the prints in which ſhe engraved on wood. She likewiſe did a great number of plants for a herbal of prince Ceſi of Aquaſparta.

Jerminica Paraſole, a lady of the ſame family, equally diſtinguiſhed herſelf by engraving on wood; and there is by her hand a large print of "The Battle of the Centaurs," from A. Tempeſta; it is coarſely executed, though with much ſpirit; but the drawing is not correct.

Odoard, or Edward Fialetti, was born at Bologna A.D. 1573, and died at Venice in 1638. He learned the rudiments of deſign of J. B. Cremonini, but afterwards travelled to Venice, and finiſhed his ſtudies in the ſchool of Tintoretto. He was an hiſtorical painter as well as engraver, and his works in both arts are ſpoken of with the warmeſt commendation; Boſchini mentions thirty-eight pictures by Fialetti, which he painted for churches and other public buildings in Venice. He etched a great number of plates as well from his own deſigns, as from thoſe of other artiſts.

His etchings are executed in a ſlight, but maſterly ſtyle. He drew correctly, frequently ſelected or invented very graceful attitudes, and compoſed his figures with much taſte. If he had left no other teſtimony of his merit than his prints, they would have been ſufficient to prove that he was a man of very great ability. He generally marked his prints with a cypher, which will be found in our *Plate* II. of thoſe of the *Italian School*. We ſhall mention the following productions of his graver, as well worthy of the notice of the connoiſſeur. A long freeze from his own compoſition of tritons, ſirens, dolphins, and other marine chimera; “The Marriage of Cana in Galilee,” a middling-ſized plate lengthways, from Tintoretto; four ſubjects from Le Pordonone, “Venus and Cupid;” “Diana at the Chace;” “The God Pan;” and “A Man holding a Vaſe;” “The Paſtimes of Love,” a ſet of twenty ſmall upright plates, from his own deſigns; entitled “Scherzi d'Amor expreſſi da Odoardo Fialetti, pittore in Venezia;” a book with ſtudies for drawing, in folio, publiſhed at Venice A.D. 1608: a book of the coſtumes of different nations; and another of antique friezes, after Poliſilo Ziancalei.

Guido Reni, the celebrated hiſtorical painter, was born at Bologna in the year 1575, and died in the ſame city in 1642. He learned the elements of drawing of Denis Calaveart, whom he quitted, to ſtudy in the Bologneſe academy. But of his great talents as a painter we ſhall treat under the article RENI, and have only to notice him here as an engraver.

There are a great number of prints by his hand, which are etched in a bold, free ſtyle. His heads are beautiful and expreſſive, and the other extremities are drawn with all that taſte and judgment which might be expected from ſo great a maſter; though they are very ſlightly executed, their intrinſic beauty, and the vigorous but diſcriminating intention of the artiſt, which is every where apparent to the eye of taſte, have ſtamped a high value on them, which they juſtly deſerve. Simon Cantarini, called Il Peſareſe, copied the ſtyle of etching of Guido with ſo much preciſion, as ſometimes to deceive the eye of the unwary connoiſſeur; but in general, the extremities of the figures in the plates of Cantarini, are not marked with that admirable taſte ſo diſcernible in the works of Guido.

He ſometimes marked his plates with his name, or monogram, which is among thoſe of the Italian engravers in our *Plate* II. The following are among the productions of his hand, the whole number of which, according to Mariette, amount to two hundred and eighty-nine.

From his own Companions.—A buſt of pope Paul V. in oval, very rare; the profile of a man; another, with a long beard; “The Virgin with the Infant Jeſus, with St. Joſeph in the back ground,” in 4to. one of the fineſt engravings of Guido; “The Virgin with the Infant Jeſus aſleep at her Breaſt;” a ſubject which Guido has treated in three different ways; another “Virgin and Child, with a Book;” the only plate which Guido has executed entirely with the graver; three other holy families, repreſented in different ways; “St. Chriſtopher, with the Infant Jeſus on his Shoulders, going over the Sea;” “St. Jerome praying before a Crucifix, in his Cave,” in 4to.; “Cupid contemplating a female Figure, who holds a Compaſs and Tablet;” “Two Children carrying a third on their Shoulders,” in 4to.

The following are after other maſters: “A Glory of Angels,” after Lucas Cambiſi, in folio. This print is reckoned Guido's maſter-piece. “The Entombing of Chriſt,” a middling-ſized upright plate, from Parmegiano, a very fine print; “The Infant Chriſt ſitting on his Mother's Lap, laying his Hand on the Tabernacle, with St. Joſeph,” from Aug. Caracci, falſely attributed to Annibal, in 4to.; “The Virgin Mary ſuckling the Infant Jeſus,” from Caracci, in 4to., executed on a blank ground; “The Charity of St. Roch,” dated 1610, in large folio. Theſe are the principal engravings of Guido, of the whole of which Adam Bartſch of the library at Vienna has given a very good catalogue.

For an account of Franciſco Brizzio, the pupil and aſſiſtant of Agoſtino Caracci, ſee the article BRIZZIO; and for the biography of Horace Borgiani, who lived alſo at this period, ſee BORGIANI. The monogram uſually affixed by the latter to his engravings will be found in *Plate* III. of thoſe of the *Italian School.*

Raphael Scaminoſi, or Schiaminoſſi, was born at Borg S. Sepolcro in the year 1580. He was the diſciple of Raphael dall Colle. He performed ſome few engravings on wood; and there are a conſiderable number of etchings by him,—Florent le Compte ſays a hundred and thirty,—which are executed in a bold dark ſtyle. There is a coarſeneſs in them, which gives them a diſagreeable appearance at firſt ſight; but on examination, they will be found to poſſeſs great merit. His knowledge of drawing ſeems to have been very extenſive; and the characters of his heads are ſtriking and appropriate. His monogram is copied in *Plate* III. of thoſe of the *Italian School.*

The following are ſome of the beſt productions of his needle: “The Virgin and Child,” a middling-ſized upright, inſcribed “Raphael Schiaminoſſius, Pictor ex Civitate Burgi Sancti incidebat, A.D. 1613;” “St. Francis preaching in the Deſert,” from his own compoſition; a ſet of the twelve Apoſtles; a ſet of fourteen ſmall plates, lengthways, intitled “Myſteria Roſarii beatæ Mariæ Virginis,” publiſhed at Rome, 1609, all from his own deſigns; the fifteen Myſteries of the Roſary, in folio; “The Martyrdom of St. Stephen,” a middling-ſized plate, lengthways, from Lucas Cangiagi; “Mary Magdalen carried away by Angels,” after the ſame, in folio; “The Viſitation of the Virgin,” from Barroccio, in folio; a middling-ſized plate, lengthways, from the ſame maſter, of “A Repoſo;” “The Holy Virgin in the Clouds, with St. Cecilia, and another Saint,” from P. Veroneſe, in folio; “The Virgin Mary on a Globe, ſurrounded by Angels,” from B. Caſtelli, in folio; a ſet of twelve wood-cuts of the twelve Apoſtles; another ſet of portraits of the firſt twelve Cæſars, from Tempeſta, alſo engraved on wood.

Jean Lanfranc. This diſtinguiſhed artiſt was born at Parma A.D. 1581, and died at Rome in 1647. He firſt ſtudied under Auguſtino Caracci; but on the death of this maſter, went to Rome to complete his ſtudies under his brother Annibal, where he was knighted by pope Urban VIII.

His merit as a painter will be treated of under the article LANFRANC. We ſhall ſpeak of him here only as an engraver.

The mode of art which he practiſed was etching, and his etchings, though haſty productions, poſſeſs merit. He commonly marked his plates with his name, or initials, but not combined in a cypher; and his moſt eſteemed prints are mentioned in the following ſhort liſt: “The Triumph of a Roman Emperor,” in large folio; “An Emperor haranguing his Soldiers,” the ſame; the Bible of Raphael, from pictures in the Vatican, engraved in conjunction with Siſto Badolocchio, (of whom we ſhall next proceed to ſpeak,) and dedicated to Annib. Caracci, 1607, in 4to.

Siſto Badolocchio was of the family of Roſa, born at Parma in the year 1581, and died at Rome in 1647. He was the contemporary and fellow-ſtudent of Lanfranc. There are ſome pictureſque little etchings by him, in which we diſcover correctneſs of deſign, and facility of handling his tool. He marked his prints, of which thoſe that follow are held in moſt eſteem, Siſto B. “The Statue of the Laocoon,” from the antique, in large folio; “The Apoſtles and the Angels, with the Chandeliers of the Cupola of Parma,” from Correggio, ſix plates in folio; “A Holy Family, with St. John,” a ſmall upright plate of half figures only; Raphael's Bible, from the pictures of

Raphael in the Vatican, ſmall plates, lengthways, engraved conjointly with Lanfranc.

Octavius Leoni was born at Rome in 1582, and, under the inſtruction of his father, he acquired ſome degree of excellence as a painter. As an engraver, he is believed to have been ſelf-taught; for, excepting the hints which he might have borrowed from Boulanger and Agoſtino of Venice, he imitated none of his predeceſſors. There are a ſet of twenty portraits, chiefly of diſtinguiſhed artiſts, from his hand, engraved in a ſingular and ſtriking manner. The hair and draperies are executed with ſtrokes; the fleſh is done in round dots; and the dark parts of the eyes and ſharp ſhadows being aſſiſted with ſtrokes, which are managed in a ſkilful manner, produce a pleaſing effect. Theſe heads are finely drawn, and ſome of them finiſhed in a much higher ſtyle than is uſual with painters, when they take up the point or the graver. The following are among the portraits: Eques Ottavi Leonus, Lodovico Leonus, Johannes Franciſcus Barbeiri, Marcellus Provenzalis, Eques Chriſtopher Ronchalis de Pomeranciis, Eques Joſeph Ceſar Arpinas, Antonius Tempeſta, Thomas Salinus, Don Antonius Barberinus, Pierre Jacopo Martello, a poet, whoſe portrait is adorned with paſtoral alluſions.

Remigio Cantagallina was born at Florence in 1582, and died in the ſame city A.D. 1624. He for ſome time frequented the ſchool of the Caraccii, but afterwards learned (with his two brothers Antonio and Giovanna Franciſco) engraving of Julio Parigi. Remigio drew extremely well with a pen and ink, and ſometimes, with great good ſenſe, imitated this mode of art in his etchings.

His etchings are chiefly after his own deſigns, though he ſometimes engraved after other maſters; and it is no ſmall addition to the fame of this artiſt, that Callot and Della Bella were his pupils. The cypher which he commonly uſed is copied in *Plate* III. of the monograms of the *Italian School.* We ſhall ſpecify the following of his works: "The Aſſumption of the Virgin, wherein ſhe is crowned by two Angels," in 4to., after Callot; four ſmall landſcapes, dated 1609, from Roſſi; a ſet of ſix landſcapes; another ſet of twelve, in octagons, with the cypher of the artiſt; another ſet of ſix; another ſet of nine and twenty prints, the ſcenes of an opera; and the repreſentation of the fete given on the Arno, at the marriage of the prince of Tuſcany, from the deſigns of Julio Parigi, in folio, 1595.

We now approach two artiſts, both of them diſciples of Cantagallina, of a very different kind from any of their predeceſſors, of more enterpriſing ſpirit and more original powers, if not of more vigorous intellect, than the ſchools of Italy have yet preſented to our notice: but having already treated of the biography and profeſſional merits of Callot and Della Bella, (ſee the articles Bella and Callot,) before our claſſification of the engravers into the ſeveral ſchools of Europe was determined on, we can do little more in this place than add more copious liſts of their very eſtimable engravings.

The number of Callot's engravings, conſidering the ſhort period of his life, is not leſs wonderful than the various multitudes of figures by which ſome of them are peopled. The beſt catalogue with which we are acquainted is contained in the third volume of the Baron Heinnekin's Dictionary, from which we have extracted the principal, in conformity with our plan.

Subjects from Holy Writ, and the Monkiſh Legends.—"The Paſſage of the Red Sea," in 4to. of which connoiſſeurs are deſirous of poſſeſſing each of the two different ſtates in which the plate was printed. "Elias and the widow of Sarepta;" "Ecce Ancilla Domini," or "The Annunciation," after Matteo Roſelli, in 4to. This is a rare print, and is diſtinguiſhed from another of the ſame ſubject, called "The little Annunciation," as well by its being without the engraver's name, as by its Latin inſcription. "St. John preaching in the Deſert," 4to. "The Parable of the Huſbandman ſowing Seed," with a Latin inſcription, 4to. This plate is ſolely the work of the graver. "Ecce Homo," after Stradan, folio, engraven at the age of eighteen. "Chriſt bearing the Croſs," a ſmall oval, engraven on a ſilver plate. "The Crucifixion, with the Virgin Mary, St. John, and Mary Magdalen, embracing the Croſs," a ſmall and rare print. "The Entombing of Chriſt," after Ventura Salimbini, the work of the graver alone. "Our Saviour with the Diſciples at Emaus." "The Virgin Mary with the infant Chriſt," an oval. Another, wherein the Virgin is embracing our Saviour, 4to. Another of the Virgin, after Andrea del Sarto, wherein is introduced St. John and Elizabeth, 4to. Another, after P. Farinati, with the infants Chriſt and St. John, folio. "Our Lady, with three Ears of Corn," 4to. "A Holy Family," inſcribed "Minor ſervi et majoris, &c." 4to. Another Holy Family, after Sadeler, in 4to. entirely performed with the graver. "The Aſſumption with the Cherubim," 8vo. There is another of this ſubject, called "The little Aſſumption," in an oval. "Benedicite," another Holy Family, 4to. "The Triumph of the Virgin," folio, dedicated to Charles IV. duke of Lorraine, and Bar. folio; "St. John the Evangeliſt in the Iſle of Patmos," in 4to. nearly ſquare; "St. Francis:" of this ſubject there are two engravings, one known by the name of "The little St. Francis of the Tulip;" and the other termed "The Tree of St. Francis," at the foot of which are ſeveral monks at prayers, 4to. nearly ſquare; "The Temptation of St. Anthony," the firſt plate of this ſubject, (which is a large folio,) is dedicated to Monſ. Philippeaux de la Vrilliere, beneath it are Latin verſes with his coat of arms, and it is dated in 1635.

As Fuſeli has painted three pictures from the ſame fairy ſcene in Shakſpeare's Midſummer Night's Dream, ſo Callot, to ſhew that his imagination was far from being exhauſted on the ſubject of the temptation of St. Anthony, has engraved a ſtill larger plate from this celebrated legend, which is very conſiderably varied from that of which we have ſpoken; and, though not the beſt, the ſecond is by much the ſcarceſt print of the two; for the plate, having been materially damaged by accidental contact with ſome acid, a good impreſſion, before the accident, is now rarely to be met with. "The Martyrdom of St. Lawrence," a ſmall oval; "The Martyrdom of St. Sebaſtian:" this is a large and grand compoſition, in form of a frieze. "St. Nicholas preaching in a Wood;" "The Miracle of St. Manſuette.:" this is reported to be the earlieſt of Callot's etchings, it is in folio, and the ſhadows are expreſſed by broad and coarſe hatchings, and almoſt, if not quite, every line in it is re-entered with the graver. St. Manſuette was a biſhop of Tours, who is here repreſented as reſtoring to life the ſon of king Leucores, who had fallen into a river in reaching for his tennis ball. "The twenty-three Martyrs of Japan," in 8vo.; "The Infant Prieſt, or carrying the Hoſt," a ſmall plate, for which Callot himſelf is ſaid to have entertained ſo great partiality, that he occaſionally wore it, as ſome of the foreign orders of nobility are worn, ſuſpended from a button hole of his waiſtcoat. The proofs which were taken before the plate was perforated to admit the ribbon or ſtring are rare, and are eſteemed valuable among connoiſſeurs. "A Nun kneeling before a Crucifix," in 4to.: this piece is known by the name of "Santa Tereſa," but it appears from the inſcription that it is the portrait of Marie Victoire, the foundreſs of the convent of the nuns of the Annunciation, at Genes, who died Dec. 15, 1617. "The Poſſeſſed," or the Exorciſm, after And. Boſcoli, in folio, entirely the work of the graver. "The Courſe of Human Life," after Bernardino Poutti. This is a ſet conſiſting of four plates, which are vulgarly called Hell, or Purgatory. "Vita beatæ Mariæ Virginis Matris Dei, Emblemata delineata:" a ſet of 27 plates in 12mo. "Glorioſiſſima Virginis Deiparæ Elogia," conſiſting of nine plates of devotional ſubjects, 8vo. "The New Teſtament," conſiſting of twelve plates, including the title. N.B. The moſt valued impreſſions of this ſet, are thoſe which were printed before the inſcription that Fagnani inſerted underneath the engravings. "The Paſſion of Jeſus Chriſt," conſiſting of ſeven finely executed plates in 4to. "The Paintings in the Church of St. Peter at Rome," conſiſting of twenty-nine or thirty plates, in 8vo. of which the ſubjects are the Acts of the Apoſtles. Theſe are the plates of which we have ſpoken in our biography of Callot, as engraved at Rome, with the graver alone, under the direction of Philip Thomaſſin. "Vita Hiſtoria Beatæ Mariæ Virginis, Pariſiis," fourteen plates, including the title and tail piece. Theſe may be diſtinguiſhed from Callot's other plates, in honour of the bleſſed Virgin; by the inſcription "Attributa beatæ Mariæ." "Male and Female Penitents," ſix plates, of which the ſubjects are 1. The Title by Ab. Boſſe; 2. St. Jerome; 3. St. John; 4. St. Francis; 5. St. Mary Magdalen; 6. The Death of the Magdalen. "Salvatoris beatæ Mariæ Virginis ſanctorum Apoſtolorum icones," a ſet of ſixteen plates in 8vo. publiſhed at Paris in 1631. "Martyrium Apoſtolorum," a ſet of ſixteen finely engraved plates, in 12mo. "The four little Banquets," a ſet of four ſmall plates, of which the ſubjects are 1. The Marriage of Cana; 2. The Repaſt at the Houſe of the Phariſee; 3. The Lord's Supper; 4. Our Saviour with the two Diſciples. "The Life of the Prodigal Son," in 12mo. publiſhed by Iſrael in 1635. "Sulta d'alcuni miracoli, etc." after various maſters, forty-one plates in 12mo. "Lux Clauſtri," repreſenting, under various emblems, the ſweet ſerenity of a religious life, and conſiſting of twenty-ſeven plates with an hiſtorical title. "The ſeven Mortal Sins," on ſeven plates, 12mo.

Battles, Sieges, &c.—"A General on Horſeback," an army in flight, ſurmounted by a hat and feathers, and the truncheon of command, ſmall. "A Piſtol ſhot," a grand review of cavalry. "Deſcent of the Troops into the Iſle of Ré:" this engraving is of an oblong form, and is encloſed in an ornamented border. "The Siege of Ré," a ſet conſiſting of ſix large engravings in ornamented borders; the borders are engraved on ſeparate plates, and four plates of writing accompany the ſet. Theſe were engraved at Paris, under the patronage of the king of France. "The Siege of Rochelle," embelliſhed in the ſame manner, and alſo done under the patronage of the French king. The portraits of the king, and of Gaſton of France occur in the borders. "The Siege of Breda," a ſet conſiſting of ſix large engravings, and two double leaves of engraved writing, recording the events of the ſiege: theſe plates were engraved for the Infanta of Spain. "Battaglia de ri Teſſi et del re Tinta," a large engraving, which is uſually called "L'Evantail," or "The Fan," on account of its form. It is encloſed in a border, and repreſents a curious firework which was played off on the Arno. The words Teſſi and Tinta allude to the weavers and dyers (tiſſerand and teinturier) who at that time enjoyed great privileges at Florence. "The Heroic Actions of the Medici," after Ant. Tempeſta, engraved on fifteen folio plates, and without any etching. The impreſſions from theſe plates, which are found in the "Galeria Medicia," are not eſteemed the beſt. "The Great Miſeries, or Horrors of War:" theſe admirable compoſitions are a ſet of eighteen 4to. plates, and were publiſhed by Iſrael in 1633. They were followed by "The Leſſer Evils of War," on ſeven 8vo. plates, including the title, (which is by Ab. Boſſe,) publiſhed in 1636. "Military Exerciſes," on fourteen ſmall plates, publiſhed alſo by Iſrael. "Combat at the Barrier," a ſet conſiſting of eleven plates including the title. Theſe prints are of different forms and ſizes. They were originally publiſhed by Callot himſelf, at Nancy, in the year 1627, but have ſince undergone ſome alterations; the work is in 4to. "Naval Engagements:" theſe conſiſt of the victories gained by the grand duke of Tuſcany over the Turks, and are alſo in 4to. dated 1617. "Seven Tilting Pieces," in 4to. engraved at Florence, four only of theſe bear the name of Callot. "Jouſts and Tournaments," a ſet of five ſpirited prints in Callot's beſt manner, in 4to. of which the ſubjects are, 1. A plan of the Jouſts and Tournaments. 2. A Battle encloſed within oval liſts, inſcribed "Uno Degli abattiments; 3. Several ſquadrons in battle array, encloſed in a ſimilar manner, and inſcribed "Moſtra della Guerra, d'Amore;" 4. Parties of cavaliers racing in a circle; 5. Four triumphal cars characteriſtic of the quarters of the globe, drawn by appropriate animals, and inſcribed "Carra del Aſia," &c.; they were publiſhed at Florence, and are after the deſigus of Callot's firſt Roman maſter, Giulio Parigii. "La Guerra d'Amore," conſiſting of four 4to. plates, from the deſigns of the ſame maſter. They repreſent the ballets, &c. celebrated at Florence on the occaſion of the arrival of the prince of Urbino, by the grand duke and Tuſcan nobility on the plain of St. Croix.

Profane and Miſcellaneous Subjects.—"The Giants," a large folio plate, in which Callot has introduced an aſſembly of the heathen deities, Temple of the Muſes, &c. "The Giants ſtruck by Jupiter's Thunderbolts," in folio, of the oval form, and now very ſcarce. "Pandora," a folio plate. The gods are here repreſented as aſſembled on Olympus, with Jove armed with thunder on its ſummit. "Catafalque de l'Empereur Mathias," a folio plate, dated 1619, and inſcribed "Eſſeque celebrati in Fiorenza," &c. "A Gambling Houſe," a folio plate, the ſubject a night-piece, with gameſters; Callot afterwards repeated this engraving, reverſing the right hand to the left. "The Puniſhments," in 4to.; this is regarded as one of the chef d'œuvres of the maſter, not only on account of its intrinſic merits, but of the great number of figures contained in it, of the compoſition and grouping of which we have already ſpoken. Its ſubject is the execution of various criminals. In the moſt perfect impreſſions of this plate, a ſmall ſquare tower appears above the houſes, a little to the left of the middle of the print, and a very ſmall image of the bleſſed Virgin, is placed at the angle of a wall which forms the corner of a ſtreet, and is alſo near the middle of the engraving.

The following are generally known among collectors by the name of the three ovals; "The Adoration of the He-goat or the Sabbath;" "An Altar, with two ſmall Figures at Prayers;" "A veiled Female, ſtanding before the Throne of an Emperor." "Eſſeque della Regina d'Eſpagna," conſiſting of twenty-ſix plates in 8vo., after Ant. Tempeſta. Of theſe Callot himſelf engraved only eight, the remainder are by Tempeſta himſelf, or by anonymous artiſts; "The Whims or Fantaſies" of the noble Jacques Callot, fourteen ſmall plates of whimſical ſubjects, publiſhed by Iſrael in 1635; "Capriccie de varii figure di Jacobo Callot in aqua-forti," on ſixteen ſmall plates engraved at Florence; "The Caprices," which are copies of the above, engraved at

Nancy. Beneath the title of the latter is inſcribed "excud. Nancy," but the Florentine ſet is executed with ſuperior taſte and feeling ; "Varie figùre di Jacobo Callot," on ſeventeen ſmall plates, including an hiſtorical title ; "Balli di Stefania," on twenty-four ſmall plates, including an hiſtorical title : each plate contains three figures ; "Varie figure Gobbi di Jacobo Callot, fatte in Fiorenze," a ſet of ſixteen ſmall plates, generally called, in England, the Hunchbacks, or Pigmies. This is a droll ſet, and as the author may be ſaid to have here preſented us with a back view of nature, the title page is a figure who ſhews his poſteriors. Callot repeated this ſet with ſome variations. "Les Guerra di Callot," twenty-five plates in 8vo., which are much ſought after by connoiſſeurs. On a piece of drapery in the title page, is inſcribed "Capitano di Baroni ;" "March of the Bohemians," on four 4to. plates in form of friezes. Theſe are probably done from his lively recollections of the gang with whom he firſt travelled from Lorraine to Florence ; "Nobility, or the Faſhions of the Times," twelve plates in 8vo., on which are pourtrayed ſix of either ſex with very amuſing backgrounds.

There are four other ſimilar prints, but of a larger ſize, by Callot, which are very finely executed, and which conſiſt of the coſtume of the inferior orders : 1. A Woman in a Corſet trimmed with Fur. 2. A Villager ſpinning. 3. A Countrywoman walking with a Baſket on her Arm. 4. A Woman with her Face ſeen and Petticoat turned up. "Tragedia del Co. Bonarelli," on ſixteen quarto plates, with a portrait ; "The three Interludes of Florence," in 4to. after Giulio Parigii. Theſe repreſent a feſtival given at Florence during the carnival, and are rare, particularly the two latter ; the plates for "A Voyage to the Holy Land," conſiſting of forty-eight in 8vo. which Callot engraved for a Grey friar, with whom he had formed a friendſhip, and who publiſhed this voyage ; "The Twelve Months of the Year :" theſe twelve prints are rare ; they are after Jodogus de Momper, in 4to., and ſolely the work of the graver ; "The Four Seaſons," in 4to. extremely ſcarce. Theſe prints are copied from four engravings that the Sadelers engraved after Baſſan ; "The current Coin of Germany, Italy, &c." ten ſheets, engraved at Nancy for Gaſton of France, and publiſhed at Paris by Iſrael Silveſtre in 1662 ; "A Woman ſitting in a Field," a child in her arms, and another eating fruit, is ſeated under a tree, a ſmall engraving, and very rare ; two ſmall prints, called by the French collectors "Deux Filenſes aſſiſes," and "Deux Dames qui ſe prominent," are alſo rare ; "Two Females habited al Allemande ;" "A female Gardener with an Aſs ;" and "An old Man, accompanied by a little Boy," are ſmall plates, with landſcape backgrounds.

The following farcical ſubjects are executed on ſmall plates, in the ſame ſtyle as the celebrated "Beggars" by this artiſt, and with equal ſpirit, *viz.* "A comic Figure," (a ſort of Falſtaff, with a large belly and wearing a ſword) ; "Two Harlequins," who are dancing in groteſque attitudes ; and "A Buffoon," "A Scaramouch," and "A Pierrot," three plates with theatrical backgrounds ; "A Comb Merchant," another comic figure, bearing a pedlar's pack on his back, and holding a comb in his hand.

Topographical and other Landſcapes.—"View of the Louvre, with the ancient Tower of Neſle," a folio plate ; "View of the Pont-Neuf at Paris," ditto. Theſe are of the beſt of Callot's landſcapes. Another view of the Pont-Neuf was engraved by our artiſt in 1629, in which the ground was etched by Silveſtre. This is a 4to. plate, and the impreſſions which are (on account of their rarity) moſt in eſteem, are thoſe which were taken before Silveſtre touched the plate ; "The Parterre of Nancy," where many perſons are walking, a piece in the long and narrow form of a frieze ; "The Garden of Nancy," an extremely rare print, inſcribed Jac. Callot, inv. et fec. ; "La Carriere," the new ſtreet of Nancy, in which is introduced a carouſal and tilting-match. This is alſo in the form of a frieze, and the earlier impreſſions are without the name of Silveſtre ; "La petite Place de Sienne," in 4to. ; "The Great Fair of Madonna del Imprunetta," called in England "The Great Fair of Florence," on account of its having been engraven in that city. It repreſents a fair which is annually held in honour of the miraculous conception ; and is eſteemed one of the moſt capital, as it is one of the largeſt of the engravings of Callot, being in length twenty-ſix inches and ſixteen in height. It conſiſts of a bird's-eye view over a vaſt area, which is terminated by the church of the holy Virgin, and more remotely by diſtant mountains. Within the area thouſands of figures, grouped with appropriate taſte and ſkill, are engaged in all the varieties of buſineſs and entertainment which is preſented by an Italian fair held under a genial ſky. It perfectly ſuggeſts Milton's idea of

"The buſy hum of men,"

and is in truth a ſurpriſing production, ſuch as modern art, and modern attention almoſt would turn from in deſpair : yet ſo ſuperior was the patient attention of the public of two centuries ago, and the patient ſkill of our artiſt, that Callot *copied* this print, on account of the great demand for it, and even, as ſome authors have aſſerted, engraved a third plate of the ſame ſubject, with ſome ſlight variations.

The firſt plate, which was publiſhed in the year 1620, is diſtinguiſhed from the ſecond, by the words "*in Fiorenza,*" which appear below at the right hand corner of the margin of the plate, whereas in the ſecond plate, the words in the ſame part of the margin are "*fc Florentiæ—et excudit Nancij,*" which latter word has occaſioned it to be contradiſtinguiſhed among connoiſſeurs and dealers, by the title of "The great Fair of Nancy." The firſt plate may alſo be known to perſons of taſte and diſcernment, from the ſecond, by its ſuperior ſtyle of execution : there is a certain ſpontaneouſneſs, the reſult of original feeling, in the firſt, which could not be copied even by the author himſelf, without ſome ſymptoms of reſtraint. The ſcarcity of good impreſſions alſo makes it bear a much higher value than the copy : for as it was far leſs ſucceſsfully corroded with the aquafortis, the number of good impreſſions which the plate produced was much more limited.

A third plate of this ſubject is mentioned by Roſt and Huber, but the preſent writer has not ſeen it, nor does it appear to have been ſeen,—at leaſt it is not mentioned—by Strutt. Perhaps the copy by Savery may have led theſe authors into error on this point. The copy may eaſily be known from thoſe by the hand of Callot, by its inferior merits, and by its being reverſed. "La petite Foire," (the little fair) otherwiſe called "The Players at Bowls," is not properly the repreſentation of a fair, but of a village fete. Peaſants are dancing in a ring, and the muſicians are ſeated in a very large old tree, which has all the appearance of being a portrait. The players at bowls, are a group at the right hand corner of the print. Strutt ſays, that "this is one of the ſcarceſt of Callot's works, and it is very difficult to meet with a fine impreſſion of it, for the diſtance and other parts of the plate failed in the biting." It is an oblong folio, and the proof impreſſions, which, of courſe, are moſt ſought after, are before the name of Callot was engraven. A landſcape, in the front of which are two pilgrims. It is in 4to. and without the name of Callot. "A Stag Hunt :"

in the ordinary impreſſions of this plate, the ſmall and diſtant wild boar hunt is ſcarcely ſeen. It is a folio, and of the frieze proportions. "A double Rock in the Middle of the Sea:" on the top of this double rock are two eagles with a bannerol, and an inſcription in honour of Columbus, in 4to.; "The two jolly Mariners," a well executed plate, in 4to.; four landſcapes, lengthways, in ſmall 4to.; "The Grand Theſe," two emblematic plates in folio, dedicated to the duke of Lorraine; "A Vine Arbour," a ſmall 4to. plate, the ſubject of which is a fete before the door of a country public houſe, with an inſcription on the margin, ſignifying that this is the *laſt* plate engraven by the late Jacques Callot, to which the aquafortis was not applied till after his deceaſe; from which it may be preſumed that the death of our artiſt was ſomewhat ſudden.

The following *Portraits* are alſo from the graver or etching needle of this diſtinguiſhed engraver. Coſmo III. grand duke of Tuſcany, in an ornamented oval. François, grand duke of Tuſcany, ditto, in 4to., very rare. Charles III. duke of Lorraine, in 4to. rare. Louis de Lorraine, prince of Phalſbourg, on horſeback, 4to. Le Marquis de Marignan, a general in the ſervice of the emperor Charles V. 4to. Donatus Antellenſis, ſenator, commonly known by the name of "The Senator," in an oval, 4to. rare. Charles de Lorme, firſt phyſician to Louis XIII., in an ornamented oval, 4to. Giovanni Domenico Peri d'Archidoſſa, in an ornamented border, commonly known by the name of "The Gardener," in 4to.

The reader may perhaps be pleaſed to be informed that a ſmall portrait of Callot himſelf has been drawn and engraved by Michael Laſne. It has the following inſcription, "Jacobus Callottus Nobilis Lotharingus Calcographus."

The engravings of Della Bella are little leſs numerous than thoſe of Callot; though the largeſt of Callot's exceed the dimenſions of any of thoſe of his ſucceſſor. Their merits were in many reſpects very ſimilar. If with the elegant lightneſs of form and exquiſite taſte of Della Bella, we ſeem more in the fairy land of engraving, Callot poſſeſſed more perſpicuity, more firmneſs of outline, and greater powers of compoſition; yet they are twin brothers in point of excellence, and, to the preſent hour, unrivalled in their department of art, though it muſt be allowed that Monſ. Berthaud, the Pariſian, has of late years made ſome very near approximations toward the merits of Callot and Della Bella. We are enabled to add the following liſt of ſelect prints by the latter, to the ſcanty liſt of Strutt, which the reader will find affixed to our biography of Della Bella:— A portrait of Della Bella, dreſſed in the Perſian habit, drawn and engraved by himſelf. Other portraits of Sigiſmund Boldrini, a noble Milaneſe. Mount-Joy St. Denis, king at arms, with a grand funeral proceſſion in the back ground; a very rare print, in 8vo. Horace Gonzales, in an oval; likewiſe very rare. Ferdinand II. emperor of the Romans, in folio. Bernardo Ricci on horſeback, ſurnamed Il Tedeſchino; Ferdinand II.'s jeſter, in folio. St. Antonin, archbiſhop of Florence, kneeling on the clouds, Della Bella's earlieſt engraving.

Hiſtorical Subjects, &c.—"St. Anthony, mounted on a Monſter with two Heads, a Man's and a Woman's," inſcribed "Super aſpidem et baſilicum ambulatis;" a ſmall upright plate of "The Departure of Jacob with Rachael and her Flock;" "Jacob's Journey to Egypt in queſt of Joſeph," in 4to.; "The Battle of the Amalekites," of the ſame ſize; a ſmall upright plate of "St. John, leaning his right Hand on a Lamb;" a ſmall upright print of "The Virgin ſitting with the Infant Jeſus;" another "Virgin and Child;" another of "The Virgin ſuckling the Infant," on a white ground; "A Repoſo," in a circle; another "Repoſo," where, in the background, St. Joſeph is leaning againſt a tree, reading, in 4to.; "A Flight into Egypt," ſurmounted by cherubs heads; another ſmall upright print of the ſame ſubject, repreſenting "The Holy Virgin, with the Infant in her Arms, ſitting on an Aſs, led by St. Joſeph;" another "Holy Virgin ſuckling the Infant Chriſt," inſcribed Caracci inv. in a circle; "The youthful Saviour explaining the Sacred Writings to his Mother and St. Joſeph:" in the clouds is God and the Holy Spirit, a very rare little print, firſt etched, and afterwards finiſhed with the graver; a very rare print, entitled "Effigie del glorioſo Martyre Sto. Benedetto;" the diſcovery of the miraculous image of "Notre-Dame del Impruneta," near Florence; "The Church Triumphant," an allegorical figure, clothed in a prieſt's garment of white linen, and crowned with a tiara, with one foot on the earth and the other on the ſea; a ſmall folio print of "St. Proſper deſcending from Heaven;" a nearly ſquare print of the tyrant Phalaris, encloſing Perillus in the brazen bull, from Polidoro; an antique bas-relief of a female with her face covered, from the ſame maſter; a ſmall ſtanding figure of Lucretia, from Parmegiano; a ſmall plate, nearly ſquare, of three children holding above their heads a wooden diſh, on which are three verſes, from Guido; an antique bas-relief of a female, ſtanding, trying to ſtop a ball; a folio print in a ſquare ornamented border, of a ſoldier on horſeback, galloping away with a female, called "Clovis and Clotilda," very rare; a ſailor, of whom a beggar is aſking charity; a young ſailor, ſitting on a hillock half covered with his cloak, laying his hand on a dog's head, with other figures; a ſmall print of four Turks, half length; another of three, with a negro and a boy; the huntreſs holding a dog, a ſingular engraving, marked twice with S. D. Bella; an eagle, with extended wings, devouring a hen; above, in a circle, are two horſes eſcaping, and a multitude of ſpectators, in ſmall folio; "The Philoſopher's Stone," in large 4to. a very fine and large print; "The Fan," or a fête on the Arno, an oval print, which was long attributed to Callot; a perſpective view of the catafalque of the emperor Ferdinand, and of the interior decoration of the church, with the arms of the family of Medicis, in folio; a grand Theſes ſupported at the canonization of Francis Solanus Condelier, at Rome, a rare print, in large folio; a plan of the ſiege of Rochelle, ſigned Stefano Della Bella del. et fecit; a large upright print of the plan of the ſiege of Arras, done for cardinal Richelieu, ſigned as before; the Repoſoir, or feaſt of God, a large print, lengthways, of which it is very difficult to find a good impreſſion; a view of the Pont-Neuf at Paris, a large print lengthways: the firſt impreſſions of this plate were taken before the weathercock was added to the ſteeple of St. Germain l'Auxerrois; a folio print of the Caſtle of St. Angelo; on the foreground are groups of figures.

The following are in Sets.—Two landſcapes; two other landſcapes in the taſte of Silveſtre; ſix different views of the Pont of Livourne, in large folio; the four ſeaſons, repreſented in ovals; the four elements; eight marine ſubjects, in the ſtyle of Callot, entitled "Divers Embarquements, faits par S. D. Bella," dedicated to Lorenzo de Medicis; ſix prints of vaſes, in 4to. in a rich and exquiſite taſte, and very finely executed; ſix landſcapes, in circles; four very fine landſcapes, with figures, in folio; four views in Rome, namely, the temple of Antoninus Pius, the arch of Conſtantine, the temple of Concord, and the celebrated vaſe in the gardens of the Medicean palace, in which Della Bella has introduced his own portrait; three grand ſubjects of battles, 1. A naval combat before the iſle of Ré; 2. The deſcent of the Engliſh in the iſle of Ré; 3. The defeat and capture of general Lambay, with a plan of the battle: theſe three plates were drawn and engraved by Della Bella, for the book of Valdor, entitled "Triomphes de Louis le Juſte;" twelve prints of Moors, Hungarians, Aſiatics, and Africans, on horſeback, in circles, with very fine backgrounds, in 4to.; a ſet of ſixteen ſmall ſquare ſubjects, repreſenting warriors, hunters, fiſhers, and peaſants, &c. very rare, and attributed by ſome to Callot; another ſet of eighteen, intitled "Raccolta di rari capricci, nuove invenzioni di Cartelli et Ornamenti, poſſi in luce dal Sign. Stefano Della Bella," of different ſizes; another ſet of twenty-eight, intitled "Vues d'édifices et d'endroits publics, miſe au jour par Iſrael Silveſtre," in folio; more than half of theſe views in France and Italy are engraved by Della Bella; a ſet of twenty-two, intitled "Divers griffonemens et épreuves à l'eau forte, faites par Stef. Della Bella," of different ſizes: this ſet has often been reprinted and enlarged, and the good impreſſions are now become very ſcarce; a ſet of five of Death preying upon the human ſpecies of all ages, with fine backgrounds; and one entitled "La ſixième mort," a melancholy ſubject, began by Della Bella, under his unfortunate malady, and finiſhed by his pupil Galiſtrucci.

Antonio Franciſco Lucini was alſo of Florence, and born in the ſame year with his countryman Della Bella, from the ſtudy of whoſe works, and thoſe of Callot, he appears to have formed his ſtyle. His plates are marked with one or other of the monograms which will be found in our *Plate* III.

His principal works are a ſet of ſixteen very rare prints of the battles and aſſaults of the Turks during the ſiege of Malta, from the pictures by Mattia Perez de Aleſio, and a fete on the Arno, of folio dimenſions, after Della Bella, dated 1634.

Franceſco Cozza has been already noticed as an hiſtorical painter in freſco. (See Cozza.) His prints conſiſt of ſpirited etchings, in which the manual part is executed with more neatneſs than has often been attained by painters. In "St. Peter's Contrition," he has ſhewn much good drawing, though the print is ſlight. The other works we ſhall mention from his hand are, "A penitent Magdalen," and "A Roman Charity;" they are all from his own compoſitions, and of folio dimenſions.

Cæſar Baſſano, or Baſſanus, was born at Milan in the year 1584. Under whom he ſtudied has not been aſcertained. He worked entirely with the graver, and his ſtyle bears conſiderable reſemblance to that of Cornelius Cort.

The moſt conſiderable work in which he was engaged, and which he executed in conjunction with Falcini and Ciamberlanus, is a ſet of ſixteen plates, entitled "Il Santo Senato de Gieſa," a very rare work, which both Heinnekin and Strutt have omitted to mention. It conſiſts of heads of the Virgin Mary, Jeſus Chriſt, and the Apoſtles, ſelected and engraved from pictures of the very firſt celebrity.

The other known engravings of Baſſanus are, a portrait of Gaſpar Aſellius; an architectural Frontiſpiece for a work by Francis Piccolini, in folio; and "The Nativity," of the ſame dimenſions.

His coadjutor Ciamberlano, or Ciamberlanus, was originally a doctor of laws, but quitted the ſtudy of juriſprudence for that of engraving. The cypher which he affixed to his prints will be found in *Plate* III. of the monograms of the *Italian School of Engravers;* and we have already mentioned the leading events of his life under the article Ciamberlano.

The principal engravings by this artiſt are "A dead St. Jerome, lying on a Stone," after Raphael; a ſet of ten plates, after different maſters, in 8vo, conſiſting of devotional ſubjects; "Angels holding the Inſtruments of the Crucifixion, Paſſion, &c.;" another ſet of fourteen, in ſmall folio, after Raphael, of "Jeſus Chriſt and the Apoſtles;" "Jeſus Chriſt on the Mount of Olives, comforted by an Angel," from Al. Caſolani, in folio; "Jeſus Chriſt appearing to Mary Magdalen in the Garden," from Barroccio, in large folio; "Chriſt appearing to St. Thereſia with his Croſs," 1615, in folio; two ſubjects of Theſes, dated 1628, in large folio.

Giovanni Franceſco Barbieri.—Guercino da Cento is the name by which this juſtly celebrated painter is moſt commonly known; for an account of whoſe great merits as a painter, ſee the article Barbieri Giovanni Francisco. As an engraver, he has left but few memorials behind him; but thoſe are executed with great freedom and ſpirit, in a manner much reſembling thoſe admirable drawings of his with a pen, which are held in ſuch high eſtimation: "St. Anthony of Padua;" "St. Peter in Grief," both half lengths, inſcribed "Joan F. Barbieri f. Id.," in folio; "St. John," the ſame; "St. Jerome before the Crucifix;" a portrait of a man with a hat on, and a curled beard; portrait of a female with curled hair; and a buſt of a man in an eaſtern coſtume, all of folio dimenſions; are probably all the prints that Guercino ever produced.

Luciano Borzoni was born at Genoa in the year 1590, and died in the ſame city in 1645. He learned the elements of art of his uncle Philippe Bertolotto, and Cæſar Corte. His pictures poſſeſs much merit, are well coloured, and carefully executed. He painted with the ſame ſucceſs in oil as in freſco; and whilſt painting the ceiling of the church della Nunziata, he unfortunately loſt his life by a fall from the ſcaffold.

He left three ſons, all artiſts, among whom Franciſco Marie diſtinguiſhed himſelf moſt, by painting landſcapes and marine ſubjects.

Borzoni etched many of his own compoſitions with a conſiderable portion of taſte, among which the following will probably be found to poſſeſs moſt merit: a portrait of Guiſtiniani; "St. Peter delivered from Priſon;" "The Vulture preying on Prometheus;" all of which are in 4to. Some Holy Families, Madonnas, and other devotional ſubjects, conſtitute the remainder of his works on copper.

Veſpaſiano Strada was the ſon of a Spaniſh painter of ſome eminence, but was born at Rome in the year 1591, during the reſidence of his parents in that city, where he died at the age of thirty-ſix.

His works conſiſt of etchings from his own compoſitions, executed in a painter-like ſtyle; ſlight and rapid, but maſterly and free. Thoſe held in moſt eſtimation are "Pontius Pilate producing Chriſt to the People," half figures, in ſmall folio; the ſame ſubject, of the upright form; "St. Catherine adoring the Infant Chriſt," in 4to.; "Chriſt crowned with Thorns," in ſmall 4to.; "The Holy Family, with St. John," ditto; "The Holy Virgin ſupported by Angels." His plates are generally marked with the initial letters of his names.

Of Aleſſandro Algardi, a Bologneſe artiſt, who lived at this period, we have already treated. (See Algardi.) To the engravings we have mentioned by him, the collector ſhould add "The Cries of Bologna," conſiſting of eighty 4to. prints after Caracci, engraved by Algardi in conjunction with Simon Guillain.

The etchings of Spagnoletto (for an account of whoſe extraordinary talents as a painter, ſee the article RIBERA) are executed in a bold, firm, and free ſtyle: his chiaroſcuro is broad, powerful, and pleaſing; and he drew with admirable ſkill. His heads, hands, and feet, are marked in a maſterly manner; and among the former, thoſe of his old men, which he was fond of introducing into his compoſitions, are deſervedly admired.

In *Plate* III. of the monograms of the *Italian Engravers*, will be found the various cyphers with which he occaſionally marked his performances, of which the following are juſtly held in eſteem: "A dead Chriſt;" "The Martyrdom of St. Bartholomew," both of folio dimenſions; in ſmall folio, "A penitent St. Jerome, with an Angel blowing a Trumpet." (Note.—There are two plates of this ſubject, in one of which the angel is omitted.) Another St. Jerome, a ſmall upright, where a ſkull lies on the ground, and the ſaint is reading; a folio plate of "Bacchus made drunk by Satyrs," dated 1628; two ſmall heads of old men, one of them with the face covered; "Dante crowned with Laurel, ſitting in a Deſert;" "Don Juan of Auſtria on Horſeback," a folio plate.

The above are all from his own compoſitions; and we know of but one work of Spagnoletto that is after another painter, namely, "A Repoſe, during the Flight into Egypt," from Charles Saracenus, wherein angels are ſoothing the holy travellers with divine muſic.

Oliviero Gatti was of the Bologneſe ſchool, and apparently ſtudied engraving under Agoſtino Caracci. He was born at Parma in the year 1598; but the time or manner of his death have not been recorded.

Gatti worked chiefly, if not entirely, with the graver; and his prints have a conſiderable ſhare of merit. He attended but little to the textures of various ſubſtances, and hence his execution is ſomewhat dry; but he poſſeſſed that firſt requiſite of a good engraver,—ſound drawing.

His beſt prints are "St. Francis Xavier kneeling on the Sea-ſhore to take up a floating Crucifix," from his own compoſition, and of folio dimenſions; a half figure of "The Holy Virgin careſſing the Infant Chriſt," in 4to., after Garbieri; "St. Jerome embracing a Crucifix," a folio plate, after Auguſtino Caracci, dated 1602; an emblematic or heraldic ſubject from Lodovico Caracci, repreſenting an armed knight, ſurrounded by Jupiter, Hercules, Neptune, Apollo, and Pallas, and an armorial bearing ſupported by two river gods, of a folio ſize; and a ſet of four ovals, in 4to., after Pordenone, of which the ſubjects are "The Deity forming the World," "The Creation of Adam," "Abraham's Sacrifice," and "Judith with the Head of Holofernes."

Giovanni Baptiſta Vanni was celebrated to a certain degree in the three arts of architecture, painting, and engraving. He was born at Piſa in the year 1599, and died at Florence in 1660. He frequented different ſchools, and is believed to have learned etching of Julio Parigi.

His etchings are performed in a painter-like manner, with freedom and ſpirit, but are deficient in correctneſs; and are marked either with the initial letters, or ſome contraction of his names. Of theſe the moſt diſtinguiſhed are "The Dome of the Cathedral at Parma," after Correggio, engraved on fifteen plates, and dated 1642; "The Martyrdom of two Saints," alſo from a picture by Correggio; and "The Marriage of Cana in Galilee," a large folio print, engraved on two plates, after Paul Veroneſe, dated 1637, and juſtly reckoned the maſter-piece of Vanni.

Giovanni Baptiſta Mercati alſo produced ſome ſpirited etchings about this period. He was a native of Sienna, born about the beginning of the ſeventeenth century, but reſided for the greater part of his life at Rome. His prints are ſlight, yet manifeſt ſome taſte; and he etched both hiſtory and landſcape.

The following will probably afford the collector the moſt ſatisfactory ſpecimens of his powers: a ſet of fifty ſmall plates of the ruined edifices of Italy, in a ſtyle which might be ſuſpected to be borrowed from that of Silveſtre, if Silveſtre had then appeared; a ſet of four of the bas-reliefs which adorn the arch of Conſtantine, of the folio ſize, and circular form; "St. Bibian refuſing to ſacrifice to Jupiter," after Pietro da Cortona, in folio, dated 1626; and "A Holy Family, with St. Catherine," a ſmall folio, after Correggio, dated 1620.

Giuſeppe, or Joſeph Cremoneſe, was born at Cremona in the year 1600, and reſided at Ferrara. There is a picture of his, of St. Mark, preſerved at the church of St. Bennet, at Ferrara, which is mentioned with great praiſe in the Italian tour of Cochin. The following prints of mediocre pretenſions are engraved by this artiſt from his own deſigns:—"Samſon and Dalilah;" "David, with the Head of Goliah;" a kneeling figure of "St. Roch," all of folio dimenſions;" "David contemplating the Head of Goliah;" a biſhop of the order of St. Bernard; and, a ſtudy of a naked female; all of quarto ſize.

Pietro, and Jacques-Antonio Steffanoni, father and ſon, were born at Venice, the father in the year 1600, and the ſon in 1620. They went to Rome, where they engraved in conjunction with each other. There is a book, etched by Pietro, of inſtructions in drawing, conſiſting of forty plates; and ſome prints for a work of antique gems, by Fortunius Licetus. This book was firſt printed at Rome A.D. 1627, and reprinted by J. A. Steffanoni at Padua in 1664. We have, among others, the following etchings by the ſon, which poſſeſs ſome merit:—"The Virgin and Child, with St. John and ſeveral Angels," known by the name of "The Virgin of the Swallow," from L. Caracci; another "Virgin and Child, with St. John," half figures, from Aug. Caracci, both in quarto; a middling-ſized upright print, of "A Merchant and his Family reduced to Beggary;" two more ſubjects of Holy Families, from Aug. Caracci; "The Slaughter of the Innocents," from Guido; "The Miracle of St. Antony of Padua," from Lorenzo Paſſinelli, in large folio; and "The Martyrdom of St. Urſula, and her Companions," of the ſame ſize.

Jean Baptiſta Paſcalini, or Paſqualino, was born at Cento, a village near Bologna, A.D. 1600, and frequented the ſchool of Cyrus Ferri; though he does not appear to have made any meritorious progreſs in painting. He engraved a great number of prints from various Bologneſe painters, but particularly from his countryman Guerchino; whoſe bold ſpirited ſtyle in drawing with a pen he attempted to imitate with the graver, but he did not poſſeſs ſufficient command of that inſtrument to ſucceed, neither is it at all adapted to ſuch a purpoſe. The etchings of Paſcalini, according to Huber, always convey the idea of original compoſitions, but in this praiſe we cannot conſcientiouſly join. Thoſe among them which are entitled to moſt commendation, are "St. Felix, a Capuchin, kneeling before the Virgin and Infant Chriſt," in folio; "St. Diego," from L. Caracci, marked J. B. Centenſis; a large folio print of "The Death of St. Cecilia," from Dominichino; "The Aurora," a large print lengthways, on two plates, from the celebrated picture of Guido, which has ſince been finely engraven by Giacomo Frey, and alſo by Audenarde.

The following Subjects are from Guerchino:—A ſmall print of "Jeſus Chriſt dictating to St. John;" a large upright print

print of “The Reſurrection of Lazarus;” “Chriſt giving the Keys to Peter,” a middling-ſized upright; “Chriſt taken into Cuſtody in the Garden of Olives,” in folio; “The Apparition of the Angels, who ſhew to Mary Magdalen the Inſtruments of the Paſſion,” in large folio; “The Pilgrims on their way to Emaus,” in quarto; “The Incredulity of St. Thomas,” in folio; a ſmall folio print of “Orpheus playing on the Violin;” two Holy Families, both in quarto; “St. Charles Borromeus;” a middling-ſized upright, entitled “St. Felice Cappucino miraculoſamente reſſuſcita unfanciullo morto;” and “Tancred and Erminea,” dated 1620.

Of Andrea Camassei; the two Curtii, Francesco Berdini; Camille Congio, and Giulio Carpione, who all lived at this period, we have already treated: as, ſee theſe articles reſpectively.

Giulio, or Julius Cæſar Venenti, was born at Bologna in the year 1609. He learned drawing under Philip Brizio, who was of the ſchool of Guido, and one of the beſt of his diſciples. Venenti was a gentleman of fortune, and not profeſſionally an artiſt, yet the meritorious plates which he etched *con amori*, have been thought worthy of a place in the Italian ſchool. His etchings are performed in a ſlight ſtyle, are marked with one of the two monograms which we have copied in *Plate* III., and their ſubjects are—“The Guardian Angel,” in quarto; “Mithridates preſented with a Cup of Poiſon;” “Tancred and Clorinda,” all after D. M. Canuti; “The Virgin of the Roſe,” after Parmegiano, all in ſmall folio; and “The Holy Family repoſing,” after Annibal Caracci, in larger folio.

For the biography of Franceſco Grimaldi, ſurnamed Bolognese, ſee that article. His etchings are performed with painter-like freedom and ſpirit, and in thoſe of landſcape in particular, he diſcovers a ſounder knowledge of perſpective, than perhaps had yet appeared in Europe, and his trees are ably characterized.

Of his numerous plates, which are almoſt entirely from his own compoſitions, we ſhall mention as worthy of preference—a rich landſcape, with buildings, and fiſhermen on the fore-ground; another, in which the baptiſm of our Saviour is introduced, both in folio; two ditto, in larger folio, of mountainous ſcenes, with figures and ruined buildings; two ditto, of the upright form, after Annibal Caracci, in one of which is a river winding through foreſt ſcenery; four ditto, from the ſame maſter. His view of Caſtel Gandolfo is a well-known and juſtly admired production, which will long continue to be a favourite ſtudy with landſcape painters, and of which there has been a finely engraved copy produced in our own country by Vivares and Chatelain.

Agoſtini Metelli (the elder), was a native of Bologna, born A.D. 1609. He ſtudied ſucceſſively under Gabriel Ferrantini and Dentone, and, beſides his merit as an engraver, excelled in painting architectural ornaments both in freſco and in oil. He was invited to Spain by Philip IV., and died at Madrid in the year 1660.

His etchings are performed with no inconſiderable portion of taſte, and we believe are entirely of an ornamental character. His ſet of forty-eight friezes are after his own deſigns. Twenty-four plates of ornaments, are partly taken from the deſigns of F. Curti, and are partly engraven by the younger Metelli, of whom we are about to treat.

Gioſeffo Marie Metelli was the ſon and ſcholar of Agoſtino, and was born at Bologna in the year 1634. After acquiring the rudiments of art from the inſtructions of his father, he ſucceſſively frequented, for his improvement, the ſchools of Albano, Guercino, Del Torre, and Cantarini.

The plates of Gioſeffo conſiſt chiefly of etching, which he executed in a ſlight manner. His chiaroſcuro is feeble, his drawing incorrect, from haſte or negligence, and he gave no attention whatever to the art of expreſſing the textures of various ſubſtances; yet what he did, could only have been done by the practiſed hand of an artiſt, and this circumſtance combined with the intrinſic merits of many of the pictures after which he engraved, have made his prints (which are ſomewhat numerous) ſought after by the cognoſcenti.

The various monograms with which he occaſionally marked them, will be found in *Plate* III. of thoſe uſed by the *Italian Maſters*, and among his beſt works may be ranked the following:—A ſet of twelve large upright folio prints, from the moſt eſteemed pictures in the churches of Bologna; a ſet of twenty, from the hiſtory of Eneas, painted by the three Caracci, in the Favian palace at Bologna, in large folio; a ſet of forty, in ſmall folio, and of the upright form, of “The Cries of Bologna,” from Annibal Caracci; “The Adoration of the Shepherds,” a large upright folio, from Correggio; “The Martyrdom of St. Eraſmus,” from Pouſſin; “David and Goliah,” from Titian; “The Invention of the Croſs,” from Tintoret, all in large folio; “Lazarus at the Gate of Dives,” after Paul Veroneſe.

He alſo produced ſeveral plates from his own compoſitions, particularly “The four-and-twenty Hours of human Felicity,” which were publiſhed at Bologna in 1675, and to which he afterwards added two plates, ſo that the complete ſet conſiſts of twenty-ſix; and a ſet, of which we know not the preciſe number, called “Metelli's Collection of Proverbs,” publiſhed in the year 1678, both of which ſeries are now become exceedingly rare.

Pietro del Po was born at Palermo A.D 1610, and died at Naples in 1692. He travelled to Rome, and was much employed there in the adornment of churches, both as painter and architect, and alſo by the Spaniſh ambaſſador.

Del Po engraved a conſiderable number of plates which conſiſt of etching mingled with the work of the graver. The general ſtyle of his art appears to be ſtudied from that of Dominichino; and the moſt diſtinguiſhed of his prints are “St. John Baptiſt in the Wilderneſs;” “The Woman of Canaan;” and “A dead Chriſt on the Lap of the Holy Virgin,” all in folio, and after Annibal Caracci; “The Madonna and Child attending to the divine Harmony of Angels;” “St. Jerome on his Knees, conſoled by an Angel;” and a ſet of the cardinal virtues, “Prudence,” “Juſtice,” “Temperance,” and “Fortitude,” all in large folio, after Dominichino; “The Annunciation;” “The Nativity;” and “The Flight into Egypt,” in folio, after Pouſſin; “Achilles and Ulyſſes,” after the ſame maſter; “Venus and Cupid viſiting the Forge of Vulcan,” after Siſto Badalochio; and “Neptune in his Chariot,” after Julio Romano, of the octagon form; all of folio dimenſions.

Giacomo del Po, and his ſiſter Thereſa, the ſon and daughter of Pietro, alſo etched ſeveral plates, in a ſtyle reſembling that of their father, among which is “Suſanna ſurpriſed by the Elders,” after Caracci, a folio plate, engraved by Thereſa.

Simon Cantarini, ſurnamed Il Peſareſe, was born at Peſaro, a city of Urbino, in the year 1610. He learned the rudiments of art under Ridolſi, but afterwards became one of the moſt diſtinguiſhed of the pupils of Guido, whoſe ſtyle, both of painting and etching, he imitated with ſo much ſucceſs, that the works of the diſciple are not unfrequently miſtaken for thoſe of the maſter.

Cantarini died at Verona, at the early age of thirty-eight. He produced a great number of prints, which are for the moſt part of religious ſubjects, and of which Adam Bartſch has formed a catalogue which we believe is complete.

Among theſe are ſeven of what the Italians term Repoſos, during the flight into Egypt, three, of which the Holy Family is the ſubject, and four, of the Madonna and Child; they are after his own compoſitions, and of 4to. dimenſions.

The remainder that are worthy of ſelection from the works of Cantarini are, “The Beatification of the Holy Virgin;” two plates of “St. John Baptiſt in the Wilderneſs;” “The Martyrdom of St. Sebaſtian;” “St. Anthony of Padua on his Knees adoring the Infant Saviour ſurrounded with a Glory of Angels,” in folio; a ſmall print of “St. Anthony of Padua kneeling before an Altar, holding the Infant Chriſt in his Arms;” “St. Benoit curing the Demoniac,” from Louis Caracci, in folio; “A Guardian Angel conducting an Infant to Heaven;” “Jupiter, Neptune, and Pluto, doing Homage to Cardinal Borgheſe,” who is repreſented in heaven ſurrounded by genii, who diſplay the attributes of the four cardinal virtues, in large folio; this print has been miſtakenly called the Quos ego, and it is one of the fineſt engravings by Peſareſe, though long attributed to Guido; “The Rape of Europa,” in folio, a very fine print, and very rare; “Mercury and Argus;” “Mars, Venus, and Cupid, at the Foot of a Tree,” from P. Veroneſe, both in folio; “Venus and Adonis, with Cupid,” in 4to.; “Love and Fortune,” in 4to. (connoiſſeurs attribute this print to Peſareſe, though it is marked “G. Renus in. & fec.”); and a frontiſpiece to a book, repreſenting a coat of arms, ſupported by two angels, blowing trumpets; at the bottom is a river god leaning on an urn; a very ſpirited etching.

Giovanni Andrea Sirani was born at Bologna in 1610, and died in the ſame city A.D. 1660. He was ſucceſſively the diſciple of Cavedone and Guido, and imitated the ſtyle of the latter, both in painting and engraving, with ſucceſs. We have ſome maſterly etchings from his hand, which may be regarded as original works, ſince they are from compoſitions by himſelf; theſe he commonly marked with his initials, G. A. S. or I. A. S. The following are generally, and we think juſtly, eſteemed among his beſt productions:—“Judith, with the Head of Holofernes,” half length, in the background is an old woman, in folio; “The Virgin and Infant Chriſt ſitting on a Cuſhion, with St. John at her ſide,” in an oval (this is from Guido); a ſmall print of “St. Michael overpowering Satan,” a middling-ſized upright print of “A Sybil ſitting on a Bank, liſtening attentively to an Angel, who is placed behind a Pedeſtal,” from Guido; “The Rape of Europa,” (this print is attributed to Sirani, but it is not in his ſtyle); “Apollo flaying the Satyr Marſyas,” a ſmall upright plate in an oval; “Saturn ſitting on the Clouds,” in 4to.; “Cupid ſtanding on a Dolphin, ſhooting an Arrow into the Sea;” a bacchanalian ſubject of four children, one of whom holds a flaſk and goblet.

Elizabeth, was the moſt diſtinguiſhed of the three daughters of G. A. Sirani, who were all artiſts; and was born at Bologna in the year 1638; ſhe learned the rudiments of deſign and painting of her father, and her hiſtorical pictures are mentioned with the greateſt commendation. She died at the early age of twenty-ſix, as it is ſaid, by poiſon, adminiſtered by ſome that were envious of her great reputation. There are many etchings by her hand, executed in a ſlight, ſpirited ſtyle, but the extremities are finely marked; among which the following are the moſt eſteemed: a middling-ſized upright plate of “The Virgin of Grief,” ſurrounded with the Inſtruments of the Paſſion, and accompanied by Angels; “The Virgin with the Infant Jeſus, whom ſhe holds on a Cuſhion, with St. John,” in a circle: this very rare and excellent print was engraved by Elizabeth, at the age of nineteen, from a picture of her own, and is reckoned her beſt production; a ſmall half length of “The Virgin, with her Hands croſſed on her Breaſt;” “St. Euſtace,” magnificently habited, in the act of proſtrating himſelf, ſtriking his breaſt with his hand, in folio; “The Decollation of St. John,” on the foreground is a profile of Herodias, accompanied by two of her women: this print has been retouched in many parts with the graver, and is not executed in the ſtyle of Sirani: yet her name is affixed to it, and its authenticity may therefore be regarded as doubtful; “Lucretia ſtabbing herſelf,” dedicated to the prelate Palcotti.

Lorenzo Loli was born at Bologna in the year 1612. He was a favourite diſciple of Guido, who was accuſtomed pleaſantly to call him his gentleman of the bed-chamber; yet the improvement of a ſtudent is not always in proportion to the favour of his maſter, and Loli never attained any great degree of excellence as a painter; but there are many etchings by him executed in a free ſpirited ſtyle, from Guido, Sirani, and his own deſigns, of which the following are held in moſt eſteem:—“A Flight into Egypt,” in folio; “A Holy Family, with St. John and Elizabeth;” another “Holy Family, with St. Joſeph leaning on a Pedeſtal in the Background,” a ſmall upright; two plates of “The Madonna and Child,” one a ſmall upright oval; “The Aſſumption,” where the holy Virgin is repreſented as ſtanding on a creſcent, and angels worſhipping (this is a rare print, and one of the very beſt productions of Loli); “St. Jerome in his Cavern;” “Mary Magdalen meditating on a Crucifix and Skull,” both in 4to.; the latter is perhaps the only plate upon which this artiſt has worked with the graver; “The Holy Virgin in a Radiance of Glory,” in folio; “The Recompence of Study,” a ſmall plate, wherein Genius and the Sciences are repreſented as leaning on the horn of Plenty; “Hercules combating the Nemean Lion,” and “Perſeus and Andromeda,” both of the folio ſize; “The Infant Hercules ſtrangling the Serpents;” “A ſleeping Cupid;” “Cupid breaking his Bow;” three ſmall plates of infant bacchanalians.

Contemporary with this artiſt was Gaſpar Dughet (ſurnamed Pouſſin from his very diſtinguiſhed brother-in-law Nicholas). For the biography and general merits of theſe great artiſts, ſee the articles DUGHET and POUSSIN. Gaſpar etched a few plates with ſpirit, (though not equal to that of his pencil,) among which are a ſet of four landſcapes in circles, of a ſmall folio ſize; and another ſet of four, ſomewhat larger.

Jean Dughet, the brother of Gaſpar, received inſtructions both from him and Nicholas Pouſſin, yet never attained to eminence either in painting or engraving.

The following prints from his hand are admitted into the portfolios of the curious, much more on account of the original pictures by Pouſſin, whence they are taken, than from their intrinſic merits as etchings; namely, “The ſeven Sacraments,” from the ſet of pictures painted for the Commandeur del Pozzo, which differ in many reſpects from thoſe which were in the royal collection of France, and are now in the marquis of Stafford's gallery; theſe are in folio, ſo large that each ſubject is engraved on two plates. “The Judgment of Solomon;” “The Birth of Bacchus;” and “Mount Parnaſſus,” are alſo in large folio.

Pietro Teſta, ſometimes called among the Italians Luccheſini, from the place of his birth, was born, of indigent parents, in the year 1611, and poverty appears to have attended him through life, notwithſtanding his merits. From his youth he manifeſted a violent inclination to purſue the fine arts, and it is ſaid, travelled from Lucca to Rome in the habit of a pilgrim. Here, regardleſs of external appearances, and even of the ordinary means of ſubſiſtence, he employed his time in drawing with the utmoſt aſſiduity from the antique ſtatues, relievos, and ruins, and in ſtudying from the celebrated pictures with which that great metropolis abounded.

Under ſuch circumſtances, and entirely unknown to the great, Teſta was ſoon reduced to diſtreſs; according to one of his biographers, his ſituation was moſt miſerable, having ſcarcely wherewithal to cover his nakedneſs, or ſatisfy the cravings of hunger, and in this ſituation he was found by Sandrart, ſitting among ruins, abſtracted from all around him, and copying an antique bas-relief.

Struck with ſuch meritorious raggedneſs, and naturally benevolent, Sandrart took our young enthuſiaſt home with him, provided him with food and raiment, employed him to make copies of the great works in the Juſtinian gallery, recommended him to other employ, introduced him to the ſchools of Dominichino and Pietro da Cortona, and would in other reſpects have rendered him a ſocial being, as well as a great artiſt, but for Teſta's natural averſion to company and converſation, which was ſo great, that even his patron could ſeldom obtain a word from him.

His propenſities to art, ſolitude, and ſilence, which, with Sandrart's friendſhip, conducted him to the high degree of excellence which he attained, occaſioned alſo his death. In reaching for his hat, which the wind had blown into the Tiber, as he ſat drawing alone, upon the banks of that river, he unfortunately fell in, and was drowned in the thirty-ninth year of his age.

The following ſummary is partly copied from the juſt eſtimate which Strutt has formed of the merits of this artiſt. He drew with great taſte, and marked the extremities of his figures in a very maſterly manner. The character of his heads are finely expreſſed, and the female faces are often very beautiful. When the extravagance of his fancy did not hurry him beyond the bounds of nature, his outlines are correct and elegant. The draperies of his female figures eſpecially, are ample, flowing, and eaſy, and the forms of the naked parts beneath are accurately and ſufficiently indicated, without academical oſtentation. Yet, though his compoſition is frequently grand, and many of his figures highly graceful, it muſt be owned that awkward and conſtrained attitudes are ſometimes introduced.

His ſtyle of etching is maſterly and free, bearing ſuperior reſemblance to that of Antonio Tempeſta, and every where animated by the wild energy of his nature; but his light and ſhades are not collected into broad maſſes, and of courſe his chiaroſcuro, like that of moſt of Italian engravers of the age of Teſta, is deficient in force.

The monogram with which our artiſt uſually marked his engravings, is copied in our third plate of thoſe of the *Italian Maſters*. His prints, in general, of which Mariette poſſeſſed ninety-two, are held in high requeſt by artiſts and connoiſſeurs, and among them the following are diſtinguiſhed. They are all of folio dimenſions, and ſome of them very large.

"The Sacrifice of Abraham;" "Angels miniſtering to the Holy Family," an emblematical ſubject, in which the Infant Saviour is embracing a croſs held by angels, very large; a large upright print of "Our Saviour crucified between the Two Thieves;" "The Martyrdom of St. Eraſmus," inſcribed "S. Eraſme ora pro nobis;" "St. Jerome at Devotion;" "St. Roch and Two Biſhops praying for a Ceſſation of the Plague;" "The Sacrifice of Camma," who having drunk of a poiſoned cup at the celebration of her marriage with Sinorix, the aſſaſſin of her firſt huſband, preſents him with the cup, a large print; "Thetis plunging Achilles into the Styx;" "Achilles dragging the Body of Hector round the Walls of Troy;" "The Death of Cato;" "The Sacrifice of Iphigenia," an allegorical print in honour of pope Innocent X. with his medallion on a monument; "Socrates, at a Table with his Friends;" "The Study of Painting," dedicated to cardinal Francotti; "The Lyceum of Painting," inſcribed "Il Liceo della Pittura," (with a dedication); "The Paſſions explained;" "Merit recompenced, and Parnaſſus triumphant;" "The Triumph of Love;" and "The Triumph of Bacchus."

Jean Cæſar Teſta was born at Rome in the year 1636, and paſſed for the nephew of Pietro, whoſe ſtyle of engraving he imitated. The following five are all we know of his works. A ſmall quarto portrait of his uncle, entitled "Petrus Teſta Lucenſis, Pictor ac Inciſor celeberrimus. Ceſar Teſta ſc." "The Death of Dido, with Iris plucking off the Fatal Lock;" "The Centaur Chiron teaching Achilles to play on the Lyre, and throw the Javelin;" "The Emperor Titus conſulting the Prophet Baſilides on his Expedition againſt Jeruſalem," from a picture by P. Teſta, in the church of St. Martin du Mont, at Rome; all of large folio dimenſions: and a very large and very rare print of "The Laſt Communion of St. Jerome;" from a picture by Dominichino, which has ſince been engraved by Farjat and Giacomo Frey.

Hyacinth, or Jacinto Gemignano, or Jeminiani, was born at Piſtoia in the year 1611, from whence he travelled to Rome, and became the diſciple of Pietro da Cortona. Here he reſided for many years with great reputation. He afterwards returned to Piſtoia, and died there at the age of ſeventy.

His plates are not numerous, and conſiſt almoſt entirely of etchings, performed in a ſlight manner, and from his own compoſitions, of which the following are the chief.

A ſet of twelve, in quarto, of groups of children variouſly occupied; "Cleopatra diſſolving the Pearl," in folio, and another folio plate from the reign of Semiramis, entitled "Semiramis jurat non niſi deviato hoſti religaturnum capillos."

Giovanni Batiſta Bolognini was born at Bologna A.D. 1611, and died in the ſame city in the year 1688. He was inſtructed in the principles of painting by Guido, and ſoon became one of his beſt pupils. He painted in the ſtyle of his maſter, and his works are held in very great eſteem.

We have many ſpirited etchings by Bolognini, from the compoſitions of Guido, which are executed in a ſlight ſtyle, reſembling that of his maſter, but inferior in merit; among theſe, the following will probably be found moſt worthy of the collector's notice. "A Crucifixion," with St. John and the two Maries, ſtanding at the foot of the croſs, in folio; "Bacchus and Ariadne," a large print, lengthways, engraved on three plates; "St. Peter receiving the Keys;" and "The Murder of the Innocents," all of folio dimenſions.

Salvator Roſa, (for an account of whom as a painter ſee Rosa, Salvator,) was born at Rinella, in the environs of Naples, A.D. 1615, and died at Rome in 1673. His etchings, though bold, preſent not the diſcriminating and characteriſtic ruggedneſs of his pencil. His drawing is incorrect; the heads of his figures are occaſionally characteriſtic, but generally mean, but his chiaroſcuro is broader and better than is to be found in the generality of the etchings of the Italian painters. Yet it is to be obſerved that, in point of executive power and feeling, his prints are far from being always alike. In his "Alexander viſiting Diogenes," his line is dry and inexpreſſive, while in his "Meditation of Democritus," and his allegorical print commonly known by the title of the "Genius of Salvator," he has entered much more into the detail of forms, and expreſſed the ſubſtances of the bones, reptiles, &c. which lie ſtrewed about, with taſte and with truth.

The cypher with which this great maſter marked his etchings, which amount to between eighty and ninety in number, all from his own compoſitions, will be found in our *Plate* III. of thoſe of the *Italian School.*

The following liſt of his prints will be found nearly, if not quite, complete :—An octavo book, containing 60 plates of banditti, in various military and other dreſſes, ſome ſingle figures, and others in groups ; a ſet of ſix, conſiſting of tritons, nereids, and other marine monſters, in the lengthened proportion of friezes ; a ſet of four, in ſmall folio, of "Apollo and Daphne," "Glaucus and Scylla," "Ceres inſtructing Phytali in the Art of Agriculture," and "Jaſon and the Dragon ;" of the ſame ſize are two plates of "St. William doing Penance," and "A Soldier ſleeping on his Shield." "Plato with his Diſciples in the Garden of Academus," "Diogenes throwing away his Cup," "Democritus meditating," "Alexander viſiting the School of Apelles," and "Alexander viſiting Diogenes," are of the ſame large folio dimenſions : in the laſt, Salvator Roſa has committed a great and palpable blunder, for Diogenes is deſiring Alexander not to intercept the rays of the ſun, yet is himſelf placed between the ſun and Alexander ; an academy of philoſophers, which is inſcribed "Ingenius liber Pictor," and "The Genius of Salvator Roſa," are alſo in large folio ; and in ſtill larger folio are "The Execution of the Tyrant Polycrates," a very grand compoſition ; "The Diſcovery of Œdipus on Mount Cytheron ;" "The Death of Regulus ;" and (of the upright form) "The Fall of the Giants."

Carlo Sacchi of Pavia, whom Strutt, by miſtake, has called a native of Batavia, etched a few plates of ſmall importance about this period. He was born in the year 1616, ſtudied under Roſſo, and died in his native city in 1706. "The Adoration of the Shepherds," from Tintoret, and "The wiſe Men's offering," from Paul Veroneſe, two large uprights, are among his beſt productions.

Now alſo lived Luigi, or Aloyſius Scaramuccia, who obtained the addition of Perugino, from the place of his birth. He ſtudied under Guido, and, as an hiſtorical painter, attained ſome eminence, but never reached beyond mediocrity as an engraver. Among his beſt prints are, "Chriſt crowned with Thorns," a folio plate after Titian ; "Venus and Adonis," after Annibal Caracci ; and a large folio print after Lodovico Caracci, from the legendary hiſtory of St. Benedict : The devil, it ſeems, had cauſed a large ſtone, which was to be uſed in building a certain church, to be immoveable, and the ſaint broke the ſpell by the fervency of his prayers.

Of Benedetto Caſtiglione, an artiſt of very ſuperior powers, who engraved ſeveral large plates at the period now under our review, we have already treated. (See CASTIGLIONE, GIOVANNO BENDETTO.) His monogram may be ſeen in *Plate* III. of thoſe of the *Italian Engravers*, and the following taſteful productions from his hand, may with advantage be added to thoſe contained in our former liſt :—"The Genius of Caſtiglione," a folio print, which is generally placed as a frontiſpiece to collections of his works ; a ſet of ſix heads, of which one is the portrait of the artiſt ; "Tobit going forth to bury the Dead, with an Effect of Night," in folio ; another from the hiſtory of Tobit, which appeared without a name, and is in clair-obſcure, is alſo aſcribed to Caſtiglione ; "The Adoration of the Shepherds ; a night-ſcene with "The Interment of St. Peter and St. Paul ;" another night-piece, with the effect of torch-light, of which the ſubject is "Philoſophers viſiting a Cemetery," all of folio dimenſions ; two of the proportions of a frieze, of which one is "Pan inſtructing Apollo on the Flute," and the other "Silenus with his Flute, and a Shepherdeſs playing the Tympanum ;" "A Combat between two marine Horſes ;" "A drunken Silenus, with three Satyrs ; a bacchanalian ſubject, with a ſatyr on the ſtatue of Priapus ; a menagerie of hens, turkey cocks, and drakes ; a landſcape, inſcribed "Gio. Benedetto Caſtiglione. Gen. fec. 1658 ;" another landſcape in form of a frieze ; "A ſhepherd Boy watering his Flock ;" "Shepherds riding and on foot, conducting their Flocks ;" "A Capuchin Friar, marked with the letter T, diſcovering the Body of St. Jerome," in folio ; and eleven ſmall vignettes of various ſizes, finiſhed with the dry point.

Bernardino Capitelli was born at Sienna in the year 1617, and received inſtructions both from Caſolani and Rutilius Manetti, but never attained to any conſiderable eminence. In his ſtyle of engraving, he mingled etching with the work of the graver, but his execution is coarſe and heavy, and his outline incorrect. Among other plates of leſs importance, he engraved the life of the patron ſaint (Bernard) of his native city, on 12 ſmall plates ; "The Miracles of St. Anthony of Padua," a folio plate divided into compartments ; "A Repoſo," from his maſter Rutilius Manetti ; "The Marriage of St. Catherine," after Correggio ; and "Ceres drinking at the Cottage Door," after Elſhiemer, from the ſame picture which count Goudt has engraven in a very ſuperior manner.

Giacomo Piccini, or Piccina, was born at Venice A.D. 1657. Under what maſter he ſtudied is not known, but he worked chiefly with the graver, in a ſtiff laboured ſtyle, without much effect ; and the outlines of his figures are exceedingly incorrect. His brother William was likewiſe a Venetian engraver, and engraved the portraits for the "Conchilia Aleſte," of J. B. Fabri. Giacomo, on ſome of his plates, ſtyles himſelf engraver to the king of France. The moſt conſiderable works he executed were a ſet of 30 portraits of the principal Venetian painters, affixed to an account of their lives by Carlo Ridolfi, publiſhed at Venice in 1648 ; moſt of the plates for a book, entitled "Le Glorie degli Incognita ;" a portrait of Alexander Farneſe ; "Diogenes, with his Lanthorn, ſitting at the Entrance of his Tub," from P. Liberi ; "A Holy Family," from the ſame painter ; "Judith with the Head of Holofernes at her Feet," from Titian ; and "A Holy Family," in a landſcape, from the ſame, all of folio dimenſions.

Giovanni Battiſta Galeſtrucci was born at Florence A.D. 1618. He learned the rudiments of painting of Franciſco Furini, and was elected a member of the Academy of St. Luke at Rome, A.D. 1652. He is mentioned as a painter, but is much better known as an engraver. He engraved in a neat, correct, and maſterly ſtyle, and was for ſome time the pupil of Della Bella, after whoſe death he finiſhed ſome plates which had been begun by that maſter. His ſtyle bears ſome reſemblance to that of Podeſta. There are a great number of prints by his hand, which in general are marked with the cypher, which will be found in our *Plate* III. of the monograms of the *Italian Maſters*, and of which Jean Jacques Roſſi has given a catalogue.

Of theſe the moſt conſiderable are, a ſet of antique gems, in four volumes quarto, with explanations by Leonard Agoſtino, publiſhed at Rome in the years 1657 and 1659 ; ſeveral ſets of antique bas-reliefs and friezes, from Polidoro

Caravaggio, which appeared under the title of "Opere di Polidoro de Caravaggio;" "John Baptiſt beheaded in Priſon," from Battiſta Ricci; "Paris receiving the Apple," and "The Caduceus of Mercury," from Annibal Caracci, both in quarto; and the Mauſolea of the family of cardinal Mazarin; a ſet of ſix prints in folio, from the Abbe Elpidus Benedictus.

Giovanni Franceſco Venturina was born at Rome in the year 1619, where he ſtudied and reſided for many years, but afterwards removed to Florence. To judge from the ſtyle of his works, it would appear that he was the diſciple of Galleſtrucci, or at leaſt worked under his direction, after his removal to Florence. From the deſigns of that maſter, he has executed a good number of prints in a neat pleaſing ſtyle, from which we ſelect the following, as affording the moſt ſatisfactory ſpecimens of his talents: "Diana and her Nymphs ſporting," from Dominichino; "The Pulpit of St. Peter," from Bernini, in folio; a ſet of bird-eye views of palaces and gardens in and about Rome; and a ſet of fountains, from Roſa of Tivoli, being a continuation of the fountains in Rome, engraved by Falda. He alſo engraved after Polydoro Caravaggio, and other painters.

Giovanni Batiſta Bonacini, or Bonacina, was born at Milan about the year 1620, and worked in his native country, and at Rome. His prints are executed in a ſtiff laboured ſtyle, entirely with the graver; and he appears to have ſtudied in the ſchool of Cornelius Bloemart; but he never arrived at any ſuperior degree of excellence. Of his works we ſhall only mention the following: four portraits, in folio, of pope Clement IX., Guido Viſconti, Ermes Viconti, and Giovania Battiſta, Count Truchi; "The Alliance of Jacob and Laban," from Pietro de Cortona, in folio; "The Virgin with the Infant Jeſus, and St. Martin kneeling before him," from the ſame maſter, which is eſteemed a capital print, in large folio; another "Holy Family, with St. John and St. Catherine," a middling-ſized upright plate, from Andrea del Sarto; and a medallion of pope Alexander VII., with an explication, from Bernini, in folio.

Flaminio Torre was born at Bologna A.D. 1621, and died at Modena in 1661. He learned the principles of painting from Cavedone, and completed his ſtudies in the ſchool of Guido. His chief excellence was in copying the pictures of the moſt celebrated maſters, which he did ſo very exactly, as to render it nearly impoſſible to diſtinguiſh the copy from the original. He etched ſeveral plates in a good ſtyle; and he had copied the pictures of the Caracii, in the palace of count Fana, at Bologna, for the purpoſe of engraving them, when, at the age of forty, he died at Modena, whither he had been invited by the duke; and they were afterwards engraved by Metelli from Torre's copies. From among the prints of Torre we ſelect the following, as moſt worthy of attention: "The Virgin and Child, accompanied by St. Francis and St. Jerome," a middling-ſized upright, from Lodovico Caracci; "The Patron Saints of the City of Bologna," a large upright plate, from Guido; and "Pan conquered by Love," a ſmall upright, from Auguſtino Caracci.

Pietro Franciſco Mola merits a diſtinguiſhed place both among the painters and engravers of the Italian ſchool. He was born, according to ſome authors, at Codra, a village on the frontiers of the Milaneſe, in the year 1609: whilſt others affirm that the place of his birth was Lugano, and the time 1621. From his childhood his talents were promiſing, and his father, who was a painter and architect, ſeconding theſe early diſpoſitions toward the fine arts, placed him firſt in the ſchool of Joſephine, and afterward in that of Albano, at Rome.

When he quitted the latter, he travelled to Venice, and ſtudied the works of Titian, Tintoretto, Baſſan, and Paulo Veroneſe, with great aſſiduity, and with ſo much advantage, that it is ſaid Guerchino became jealous of his progreſs, and that this jealouſy occaſioned his return to Rome, where queen Chriſtina allowed him a penſion, and where he was patronized by the popes Innocent X. and Alexander VII.

His friends ſeemed to multiply as his merits increaſed. He accepted an invitation to France from Louis XIV.; but during an altercation which he had with prince Pamfili, reſpecting the value of a ceiling which he had painted, he was ſeized with a violent paroxyſm of headache, and expired in about ſix hours.

For an account of his peculiar merit as a painter, ſee the article Mola. His etchings, though ſlight, are performed "with a maſter's hand and poet's fire." To a vigorous ſtyle of handling, he added correctneſs of drawing. He occaſionally etched, as he painted, both landſcape and hiſtory: his heads in the latter are beautifully characteriſtic, and carefully drawn; and in the former, his trees and his various grounds, &c. are touched with conſiderable taſte.

"The Madonna ſuckling the Infant Saviour," a ſmall upright, from his own compoſition; "A Holy Family, with Angels preſenting Flowers to Jeſus Chriſt," in folio, from Albano; "Joſeph diſcovering himſelf to his Brethren," in ſmall folio; and another "Holy Family with Angels," a folio print of the upright form, from his own compoſition; will be found among the beſt etchings of Franciſco Mola.

Of the latter print, collectors ſhould, if poſſible, obtain the impreſſions as the plate came from the hand of Mola; for it was afterwards worked upon with the graver by ſome unſkilful perſon, who has much impaired the freedom and beauty of the etching.

Giovanni Baptiſta Mola, born in the year 1622, was brother to Franciſco, and was alſo the diſciple of Albano. He etched a few plates, the ſtyle of which bears a diſtant and inferior reſemblance to that of his brother, as may be ſeen in a 4to. print, after Albano, of "Cupid drawn in his Chariot."

Carlo Ceſio, or Ceſius, was born at Antrodoco, a village in the late territory of the Roman pontiff, in 1626, and died at Rieti A.D. 1686. He ſtudied as a painter under Pietro da Cortona, but is much better known by his engravings than by his pictures. His plates are chiefly etched and harmonized with the graver in a free and maſterly manner. He drew correctly; and the extremities of his figures are in general finely marked, though ſlight, and in the broad, bold ſtyle of a painter.

Among the number of Ceſio's engravings, which is conſiderable, the following will probably be found moſt worthy of ſelection: the frontiſpiece, in 4to., to "Diſcorſi della Muſica;" and "The Holy Family," in an oval, both from his own compoſitions; two folio prints of "St. Andrew proſtrating himſelf before the Croſs," after a celebrated picture painted by Guido in conjunction with Dominichino; and "The Woman of Canaan," after Annibal Caracci: the Farneſian Gallery, conſiſting of forty-one plates, after the ſame maſter; the Pamphilian Gallery, conſiſting of fifteen plates, after Pietro da Cortona, of which the ſubject is "The Hiſtory of Æneas;" "The Life of St. Auguſtin," after Lanfranc, conſiſting of four very large and four ſmaller folio prints, engraved from pictures which adorn the church of St. Auguſtin at Rome.

Andrea Podeſta was born at Genoa in the year 1628, and became the diſciple of Andrea Ferrari. Strutt ſays, that "as a painter it does not appear that he greatly diſtinguiſhed himſelf; but ſeveral ſpirited and maſterly etchings, which he produced, prove him to have been a very ſkilful artiſt. The heads of his figures are finely characterized, and the other extremities are well expreſſed."

Among the beſt of Podeſta's prints, which in general are marked either AND. P., or *And. P. in et ſec.*, are the following: four Bacchanalian ſubjects, in large folio, after Titian, one of which is from the celebrated picture of "Bacchus leaping from his Car to greet Ariadne," which was lately in the collection of the earl of Kinnaird, and from which Mr. Bone has executed a moſt exquiſite copy in enamel; "Love cultivating the Arts," an allegorical print in folio, dedicated to Guido; and a pair from "The Life of St. Diego," after Caracci, alſo in folio.

For an account of Carlo Maratti as a painter, ſee the article MARATTI. He was born at Camerino, in the marquiſate of Ancona, A.D. 1628, and died at Rome in 1713. Strutt ſays, with great juſtice of his etchings, that "they are executed in a free and ſpirited ſtyle; much neater, and better finiſhed, than thoſe of painters uſually are. The characters of the heads of his figures are finely expreſſed;" and their graceful airs have been the ſubject of frequent commendation.

His engravings are ſomewhat numerous, and are held in great eſtimation. No collection of the works of the Italian maſters ſhould be without good impreſſions of the following:—A ſet of ten, from the Life of the Holy Virgin, after his own compoſitions, in quarto; "Heliodorus driven from the Temple," after Raphael, a large folio print, arched at the top, and engraven on two plates; "The Flagellation of St. Andrew," after Dominichino; "Joſeph diſcovering himſelf to his Brethren," after Franciſco Mola, of folio dimenſions; "St. Charles Borromeus interceding for thoſe afflicted with the Plague at Milan," a large upright, from Pietro Perugino; and (of the ſame form) "Chriſt diſcourſing with the Woman of Samaria," after Annibal Caracci; beſides ſeveral plates of the Madonna and Bambino, of various ſizes.

Giovanni Batiſta Cavazza was born at Bologna in the year 1620. He was ſucceſſively the diſciple of Cavedone and Guido, and painted ſeveral pictures for the churches of his native country. He likewiſe engraved ſome ſubjects for his amuſement, among which are the following:—"Chriſt on the Croſs;" "The Reſurrection of Jeſus Chriſt;" "The Death of St. Joſeph;" and "The Aſſumption of the Virgin;" all of folio ſize.

Dominico Maria Canuti was born at Bologna A.D. 1623, and died in the ſame city in 1684. This extraordinary artiſt, by the force of his own natural genius, acquired ſo much knowledge of deſign and colouring, that Guido beheld his works with aſtoniſhment, and received him among his pupils with pleaſure.

Beſides his pictures, we have a good number of etchings by his hand, in the ſtyle of Guido, whom he ſurpaſſed in neatneſs, finiſhing, and boldneſs, if not truth, of fore-ſhortening, which has ever been held one of the difficulties of art; though, in the general excellency of his drawing, and the ſpirit of his outline, he has not equalled that great artiſt. He commonly marked his prints with his name, or initials, among them the following will probably be found moſt worthy of ſelection:—Three portraits of Ludovico, Auguſtino, and Annibal Caracci, in 4to.; "The Virgin ſeated in the Clouds, with Chriſt ſtanding by her," a ſmall upright print, from his own compoſition; "St. Roch;" and "St. Francis praying," a ſmall upright plate, from Guido, marked "Doms. Ma. Canuti fec."

Laurentio Paſinelli was born at Bologna in the year 1629, and died at Parma in 1700. His inſtructors in the rudiments of art were Andrea Barone and Simon Cantarini, but he alſo frequented the ſchool of Flaminius Torre. From Bologna he went to Turin, and from thence to Mantua and to Venice. At Mantua he was employed by the duke in the adornment of his caſtle at Monmirola, but at Venice, ſtruck with the ſuperiority which he perceived in Paul Veroneſe, his ſtyle of painting, and his notions of art in general, underwent a complete revolution. He afterwards returned to Bologna and eſtabliſhed a ſchool.

In Cochin's Italian Tour, he ſpeaks highly of Paſinelli's picture of "The Reſurrection" in the church of St. Francis, and his few prints are ſought after with juſtifiable avidity by the connoiſſeurs. They are chiefly from his own compoſition, and to the beſt of our knowledge "St. John preaching in the Wilderneſs," (a very fine etching,) and "The Martyrdom of various Saints," in one compoſition, afford the beſt ſpecimens of his talents in this art; both are of large folio dimenſions.

Of Luca Giardano, who was now living, we have already treated pretty much at large (ſee the article GIARDANO). His *fa preſto* attended him in his voluntary offerings to engraving, as well as in his devotions to the ſiſter art. Yet his taſte allowed him to delineate the heads, hands, and feet in his etchings in a good ſtyle, and hence his works on copper are of a maſterly character, though they poſſeſs not the ſeverity of the higheſt claſs of hiſtorical or epic compoſitions. His "Deſtruction of the Prieſthood of Baal in the Preſence of Elijah and Ahab," and "St. Anne received into Heaven by the Holy Virgin," which are both of folio dimenſions, will at leaſt juſtify thus much of approbation, as would alſo the following ſubjects from the Life of Chriſt, which are all in ſmall folio, and from his own compoſitions. "The Holy Virgin and Infant Chriſt;" "St. Joſeph and St. John;" "The Penitent Magdalen;" "Jeſus Chriſt diſputing with the Doctors;" and "The Woman taken in Adultery."

Horatio Brun, or Brunette, was born at Sienna A.D. 1630, but reſided chiefly at Rome. He worked principally with the graver, imitating, though not very ſucceſsfully, the ſtyle of F. de Poilly. "The Golden Age," "The four Seaſons," "The Prodigal Son guarding Swine," a ſet of animals, all in folio, and an allegorical print of ſtill larger dimenſions, which has been called "Numa Pompilius, and the Nymph Egeria," are among the beſt of his engravings.

Lorenzo Tinti was born at Bologna in the year 1634, and was a diſciple of Andrea Sirani. He was a painter of ſome merit, and he engraved many prints, among which is the frontiſpiece to the Herbal of D. Hyacinthe Ambroſini, which was printed at Bologna in 1666. He worked for ſome time at the court of Modena, where he engraved the pompous funeral of Francis I. duke of Modena, from Franciſco Stringa. He alſo engraved from the celebrated maſters of the Bologneſe ſchool, and from the pictures of Elizabeth Sirani.

Franciſco Vaccaro, or Vaccari, was born at Bologna A.D. 1636. He ſtudied under Albano, and wrote a treatiſe on perſpective, for which he engraved the plates, and dedicated the work to counſellor Beccatelli. He likewiſe engraved a ſet of twelve perſpective views of ruins, fountains, and edifices in Italy. He continued to flouriſh as an artiſt until the year 1670, after which we hear no more of him.

Gioſeffo Zarlatti was born at Modena A.D. 1635, and learned the rudimental principles of art of J. B. Spezzini, a Genoeſe painter. He was an engraver of merit, and executed ſome plates in a very ſpirited and pleaſing ſtyle. His heads were generally beautiful, and his attitudes elegantly choſen. It is to be regretted that he died early, and engraved but little; nor are we able to ſpecify any of his works.

The name of Bartoli, (for whoſe life ſee BARTOLI,) ſhould have been honoured with a more ample liſt of his beſt productions than we were able to give at the time of publiſhing the third volume. The collector will probably be highly gratified to poſſeſs the following.

Various Antiques.—A ſet of thirty-three, intitled "Admiranda Romanorum Antiquitatum ac veteris Sculpturæ Veſtigia;" with remarks by Bellori under each; a hundred and thirty-eight prints in folio, intitled "Romanæ magnitudinis Monumenta;" a ſet of fifty-two, intitled "Veteres arcus Auguſtorum triomphis inſignes;" a ſet of ſeventy-eight in large folio, intitled "Colonna di Marco Aurelio, con brevi note da Gio. Pietro Bellori;" a ſet of one hundred and twenty-eight prints, intitled "Colonna Trajana, di Alfonzo Ciacconi;" and another ſet, conſiſting of one hundred and thirty-two, intitled "Sepolcri antichi Romani ed Etruſchi, trouvati in Roma;" the aqueduct which conducts the water from Civita Vecchia, with various views in and about Rome, in four large prints; a grand ſepulchral urn of ſtone, from the Capitol; two ſubjects from the Aldobrandini Marriage, intitled "Nova Nupta in geniali Talamo;" ninety-four in folio, intitled "Le Pitture antiche delle Grotte di Romæ del Sepolcro de Naſoni, intagliate da Pietro Santi Bartoli & Franceſco Bartoli ſuo figlio, Romæ," 1680 and 1706; a folio print, intitled "Antiquiſſimi Virgiliani Codicis Fragmenta & Pictura;" and a hundred and nineteen pieces, intitled "Le Antiche Lucerne Sepolchrale;" a collection of old pictures, correctly copied, from coloured drawings made by Bartoli, Paris.

After various Italian Maſters.—A ſet of friezes, from the Bible, on the chimney-pieces of the Vatican, by Raphael, in twelve ſmall pages; another ſet of the ſame, in fifteen leaves; another ſet, from Raphael, intitled "Leonis X. admiranda virtutis imagines;" a ſet of forty-three, of ornaments and figures, intitled "Parerga atque ornamenta in Vaticani Palatii Kiſtis," by Raphael; a ſet of four, of the divinities in cars; "Jupiter drawn by Eagles;" "Mars by Horſes;" "Diana by Nymphs;" and "Mercury by Cocks;" the hiſtory of Conſtantine in friezes of different forms, from the Vatican. "Giove che fulmina di Giganti;" (Jupiter accompanied by all the Gods, deſtroying the Giants,) from the celebrated picture by Julio Romano, at the palace of T at Mantua, in nine leaves; "The Hiſtory of St. Peter," from Lanfranc, in folio.

Various ſeparate Subjects from Italian Maſters.—"The Adoration of the Kings," from Raphael, (engraved on three plates,) of large folio; one of the fineſt productions of Bartoli; "The Infant Jupiter nouriſhed by the Goat Amalthea," from Julio Romano; "Hylas ſtolen by the Nymphs;" "Sophoniſba preſented to Maſſiniſſa;" "The Continence of Scipio," all of folio ſize, from the ſame painter; "St. John ſhewing Chriſt in the Deſert," from P. F. Mola; "The Birth of the Virgin," from Albano; "The Marriage of the Virgin," from a picture by Nicolo Beretoni, in the church of St. Lorenzo in Borgo; "Daniel in the Lion's Den," after an altar-piece by P. de Cortona; "The Virgin in Heaven with the Infant Jeſus, and Saints," from L. Caracci, all of folio dimenſions; "The Mother and Wife of Coriolanus proſtrate at his Feet;" "St. Charles Borromeus brought by an Angel to the Tomb of Vetallo," both from Ann. Caracci.

The following are from his own Deſigns.—An oval, in 4to. of "St. Stephen receiving the Crown of Martyrdom;" "St. Bernard chaining Satan;" a large folio print of the theatre erected in the cathedral of St. Peter, for the canonization of St. Peter of Alcantore, and "Mary Magdalen," engraved conjointly with Falda; the ſepulchral monument of pope Urban VIII. inſcribed "Petr. Sanct. Bartolus del et ſc.;" and an ancient mauſoleum, from Tivoli, with the figure of a lion, from P. de Cortona, in large folio.

The grand catafalco, or funeral proceſſion of Sobieſki, king of Poland, after Sebaſtian Cipriani, in large folio, was engraven by Franceſco Bartoli, a Roman by birth, and the ſon, pupil, and ſucceſſor of Pietro Sante, who ſometimes worked on his father's plates, but was inferior to him in talent and reputation.

Giovanni Baptiſta Falda, a very excellent engraver of landſcape and architecture, was born, in the year 1640, at Valduggia, in the Milaneſe, from whence he travelled, for profeſſional improvement, to Rome. Whoſe diſciple he was does not appear; but he executed his plates in a clear neat ſtyle, bearing no ſmall reſemblance to that of Iſrael Silveſtre. He drew and engraved a great number of views of palaces, churches, gardens, &c. in Rome and its environs, which he enriched with ſmall figures, drawn and engraved with great taſte. And in the year 1676 he engraved a very large view of Rome on twelve plates. His works are numerous, and deſervedly held in high eſtimation. Among them the following will be found to deſerve the particular notice of the connoiſſeur. Two fine views of the ſquare of Navonne, intitled "Fontana in Piazza Navonna," and "Altra Veduta in Piazza Navonna," erected by Bernini, in folio. Two other views, in large folio, of the Baſilico at the Vatican, and the fountain of the Baſilico. A very large view, lengthways, of St. Peter's, with twelve of the moſt celebrated edifices in Rome, on the ſame plate, very rare. A view of the interior of St. Peter of the Vatican, with the beatification of St. Francis of Sales, in large folio; and a very large view of the caſtle and bridge of St. Angelo, from Bernini.

Matteo Thommaſo Piccioni was born at Ancona A. D. 1637, and became a member of the Academy of St. Luke in the year 1655. Piccioni holds a diſtinguiſhed rank among thoſe artiſts who worked in Moſaic, and executed in that ſtyle the pictures of the cupola of the chapel of St. Peter at Rome, in conjunction with Fabius Chriſtoferi and Horace Manenti. He etched ſome few plates, among which are the following, all of folio ſize. "St. Luke painting the Virgin," from a picture by Raphael; "The Adoration of the Shepherds," from Paul Veroneſe; "A Holy Family," from the ſame painter; "The Virgin with the Infant Chriſt, who is repreſented ſleeping, and St. John at his ſide," from Andrea Camaſſei; and "The Infant Moſes carried by his Mother in the Ark of Bulruſhes," from the ſame painter.

Dominica Maria Bonarera was born at Bologna about the beginning of the laſt century: he learned the principles of drawing and etching of his uncle, D. M. Canuti. Among his works, thoſe that he executed after Titian for an edition of the anatomical work by Veſalius, for the uſe of ſtudents, are the moſt eſteemed, many of which, after being etched, were finiſhed with the dry point. A monogram, which was common to him and Dominic Barriere, will be found in our *Plate* III. of thoſe uſed by the *Italian Engravers*; and the following are ſelected from the catalogues of his works, as thoſe moſt worthy attention; "St. Ann teaching the young Virgin Mary to read," from Dom. M. Canuti, in folio; "St. Thereſia with the Infant Chriſt;" "The

Martyrdom of St. Chriſtiana," all of the ſame ſize, from Canuti; "St. John baptizing Chriſt in the River Jordan," from Albano, in large folio.; "St. John preaching on the Banks of the Jordan," from L. Caracci; "Lot with his Daughters," from Ann. Caracci; and the dome of the cathedral church at Parma, repreſenting "The Aſſumption of the Virgin, with the Apoſtles and Angels," from Correggio, all in large folio.

Ambrogio Beſozzi, or Bezutius, an eminent painter and engraver in aquafortis, was born at Milan A. D. 1648, and died in the ſame city in 1706. He ſtudied for ſome time under Gioſeffo Danedi, called Montalti, but afterwards went to Rome, where he ſtudied from the antiques and the moſt celebrated pictures, and laſtly, in the ſchool of Ciro Ferri. His greateſt merit conſiſted in painting bas-reliefs, friezes, and other architectural decorations; but he etched ſome few plates, and among them the following. A portrait of Correggio, in profile, of 4to. ſize; and the apotheoſis of a princeſs, the buſt of whom was engraved by Bonacina, and the remainder by Beſozzi, from Ceſare Fiori, in folio.

Girolamo, or Jerome Roſſi, or de Rubeis, the elder, was born at Rome A. D. 1640. He learned the principles of art under Simon Cantarini, and J. B. Buoncone. He executed a few ſlight but meritorious etchings from various Bologneſe painters, among which are the following. A portrait of pope Pius V., from Scipio Gatana, in an oval; "Two Cupids playing together," a ſmall upright plate from Guercino; "The Virgin and Child, accompanied by St. Francis and St. Jerome," a middling-ſized upright plate, inſcribed "Hieronimus de Rubeis pictor delineavit incidit;" "St. Charles Borromeus kneeling before a Croſs," from Antonio Caracci, a rare print; and "St. Nicholas before the Virgin," from Francis Bonavilla, both in large folio.

Girolamo Roſſi, or de Rubeis, the younger, was born at Rome A. D. 1685, and was probably a relation of the above-mentioned artiſt. He always reſided at Rome, and engraved a conſiderable number of prints, after different Italian painters. He worked in a ſtiff heavy ſtyle, with the graver alone, without much effect or correctneſs of drawing, and engraved a conſiderable number of portraits of the cardinals of his time; forming a ſeries, which has ſince been continued by Pazzi and others. Roſſi likewiſe engraved ſome portraits of painters for the Florentine gallery. His beſt hiſtorical works are, "The Virgin and Child," from Correggio; "La Zingara, or the Repoſe in Egypt," where the Virgin is dreſſed in the Egyptian faſhion, from a picture by Ann. Caracci, both in folio; and "The Martyrdom of St. Agapita," a large plate, lengthways, from J. Odazzi.

Giovanni Batiſta Teſtana, was born at Genoa in the year 1649, and reſided chiefly at Rome, where he engraved many plates from the pictures of various Italian maſters. In conjunction with William Vallet and Stephen Picart, he executed the portraits of the heroes of antiquity, for Jean Angelo Canini, from antique gems and medals. He engraved in a very pleaſing ſtyle, not unlike that of Mellan. The following prints afford ſatisfactory ſpecimens of his talents. Two heads, of Socrates and Alexander; and another pair of Aſpaſia and Cleopatra, in 4to., for the work of Canini; "The Guardian Angel," in large folio, from Pietro da Cortona; and "The Baptiſm of Conſtantine the Great," from Aug. Caracci, of the ſame ſize.

Gioſeffo Teſtana was born at Genoa in the year 1650. Whether he was the brother, or how he was related to the above-mentioned artiſt, we are unable to aſcertain. He reſided at Rome, where he engraved many plates in the ſtyle of Giovanni Battiſta. He was employed in a work which appeared at Rome in 1680, under the title of "Portraits of Cardinals now living," and from the reſt of his works the following may be ſelected as affording ſpecimens of his abilities both in portrait and hiſtory. A portrait of brother Jerome Comitibus, from P. de Cortona, in folio; "St. Margaret of Cortona kneeling before a Crucifix;" a ſubject of a Theſes, repreſenting a Hydra, and Religion hovering in the air, holding a portrait of pope Alexander VII. On a little ſtreamer is the following inſcription; "Accedite et illuminamini," both from Cortona, of folio ſize; and two portraits, Flavius Card. Chiſius, after M. Morandi, and Aloyſius Card. Homodeus, Joſ. Teſtana del. et ſcu. both in 4to.

Crecentius de Hunufris, or de Onofriis, was born at Rome in the year 1650, and died at Florence ſome time about the cloſe of the ſeventeenth century. He was the pupil of Gaſpar Pouſſin, and painted a great number of landſcapes in the ſtyle of that maſter.

He alſo engraved landſcape in a very good taſte, and we have an engraving by him, from a picture by Carlo Maratti, of "Diana at the Chace," for the prince Livius Odeſcalchi, which is executed with freedom, and in a purity of ſtyle ſuperior to moſt of the landſcape engravings of that day. This, and a landſcape with a waterfall; an Italian landſcape with water and figures, (both in folio,) and two heroic landſcapes, one with Jupiter and Mercury, the other with Apollo in the clouds, both in large folio, afford excellent examples of the talents of this artiſt.

Giovanno Gioſeffo dal Sole, was a native of Bologna, and became both a painter and engraver of ſome eminence. He received his firſt inſtructions of D. M. Canuti, and afterwards became the pupil of Lorenzo Paſinelli. He ſucceeded in engraving both hiſtorical ſubjects and landſcapes; and died at Bologna A.D. 1719, aged ſixty-five years. We have ſeveral etchings by him, from his own compoſitions, among which are, "Jupiter and Juno preſenting Mars with a Buckler," from a cieling by Paſinelli, painted for General Monteculle, in folio; and "St. Francis Xavier preaching in the Indies," a large upright plate, from the ſame maſter.

Vincent Victoria, or Vittoria, was born at Valencia A. D. 1658. He travelled whilſt very young to Rome, and frequented the ſchool of Carlo Maratti, where he made great progreſs. He poſſeſſed conſiderable knowledge of anatomy, and his portraits are particularly eſteemed. Victoria is likewiſe celebrated as an antiquary and a connoiſſeur in works of ancient art; and poſſeſſed an excellent cabinet of gems, medals, and various antiquities; he was honoured with the titles of antiquarian to the pope, and firſt painter to the grand duke of Tuſcany. Among other literary productions, Vittoria is the author of "Obſervazioni, ſopra la Felſina pittrice de Malzaſia," a work which the celebrated J. P. Zanotti has endeavoured to refute. The portrait of our artiſt may be ſeen in the collection of thoſe of the great painters of the Florentine ſchool. He died at Rome A. D. 1712, aged 51 years. Among many prints that he etched, in a ſlight ſtyle, the following are the beſt, "The Virgin and Child in the Clouds, with John the Baptiſt, St. Francis, and other holy Perſonages below," from Raphael, inſcribed "Vinc. Victoria del. et ſculpt." rare; "The Laſt Supper," and "The Reſurrection," both in large folio, from Ciro Ferri.

Giovanni Giroiamo Frezza, was born at Canemorde, near Tivoli, in the year 1660. He learned engraving at Rome, under Arnold de Weſterhout, and executed a great number of prints, after various Italian maſters, in a neat careful ſtyle, finiſhed highly with the graver; but without any force of chiaroſcuro, or boldneſs of execution. Sometimes Frezza imitated that ſtyle of Mellan, which conſiſts of ſingle courſes of lines, yet not very ſucceſsfully, and we are obliged to ſay of his numerous productions, that the extremities of his figures in general are but poorly marked, and his drawing, though not very incorrect, is ſometimes heavy. Among his engravings the following are held in moſt eſteem. The Veroſpian gallery, conſiſting of ſeventeen folio plates, including the title, from Albano, publiſhed at Rome in 1704; “The Virgin ſitting under a Tree feeding the Infant Chriſt,” from L. Caracci; “A Holy Family, with the Infant naked in the Arms of the Virgin,” from Carlo Maratti, both in folio; “The Aſſumption of the Virgin,” dedicated to pope Clement XI.; and “The Judgment of Paris,” dedicated to the marquis Pallavicino, both from the ſame maſter, of folio ſize; “La Zingare,” or the Repoſe in Egypt, where the Holy Virgin is repreſented in Egyptian attire, from Correggio, in large folio; a middling-ſized upright plate of “The Deſcent of the Holy Ghoſt,” from Guido, very rare; “Polypheme on a Rock, and Galatea on the Water with Nymphs,” a folio print; “Polypheme hurling a Rock after Acis and Galatea,” in two plates. A ſet of ſix, including the title, from pictures in the chapel of St. Ann, in the church of the Madonna, at Monte Santo, from Nicolo Beretoni, in folio. The firſt and ſecond plates for the Crozat collection, one repreſenting “Venus,” the other “Pallas,” from antique paintings, in large folio, and the celebrated Centaurs (known by the name of Furietto), done by Ariſteas and Papias of Aphrodiſium; and preſerved in the muſeum Clementinum, from drawings by P. Battoni, and N. Honophri, in large folio.

Gioſeffo Diamantini was born at Romania A. D. 1660, and ſpent the greater part of his life at Venice, where he died in the year 1722. Heinnekin, who has left us a catalogue of his etchings, ſeems to ſay of this maſter, that his greateſt praiſe was having inſtructed Roſa Alba Carriera. Yet, according to Strutt, who profeſſes, however, to have ſeen but few of his works, “Diamantini etched in a free maſterly ſtyle, with a fine point; the deſigns are ſpirited; the actions of the figures are often very graceful, and the heads and other extremities of them drawn in a ſuperior ſtyle.”

He was honoured with the title of chevalier, and hence he often marked his prints, “Eques Diamantinus in. f.” The following are among the beſt of his works, almoſt all from his own compoſions. “Hagar in the Deſert,” in an oval, of quarto ſize; “A Holy Family, with St. John,” in folio; “The Marriage of Canaan,” from Paul Veroneſe, in folio; “The dead Body of Chriſt, ſupported on the Tomb by an Angel,” in an oval, dedicated to Gregorio Fab.; “Dido on the Funeral Pile, with Diana or Iris in the Air,” in an octagon; “Venus, Ceres, and Pomona,” dedicated to D. D. Ferdinand; “Mercury and Flora in the Air,” dedicated to D. Aloyſis Piſani; “Night purſued by Phoſphorus, or the Morning Star,” dedicated to Marc Angelo Flavio Commeni; “The Sphere, or Aſtronomy,” dedicated to Angelis, all of folio ſize; “Saturn, or a river God, with two Cupids,” of octagon form; a middling-ſized upright print of “The Fall of Phaeton;”. a ſmall octagonal print of “Mercury and Argus;” “Venus and Adonis,” an octagon; another “Venus and Adonis,” in quarto; a ſmall octagon of “Jupiter and the Republic of Venice;” a ſmall upright print of “Time, or a river God ſitting, and a Child, with his Eyes banded, lying near him, accompanied by a Muſe;” a middling-ſized upright print of “Time and Flora, crowned by a Genius;” “Strength, or Hercules ſitting by a Nymph, accompanied by Plenty,” in an octagon; a ſmall upright print of “Mars and Venus;” two more ſmall uprights of “Diana and Endymion;” and “The Sacrifice of Iphigenia;” “Boreas ſtealing away Orithrea,” in a folio octagon; a ſmall oval print of “Juſtice and Peace;” four ſmall upright emblematical ſubjects; two large ſquare ditto; and two other emblematical ſubjects, one a large hexagonal plate, and the other an oval.

Gioſeffo Niccolo Naſini was born at a ſhort diſtance from Sienna, A.D. 1660. He learned the rudiments of art from his father Franciſco Naſini, but was ſent to Rome at the age of eighteen, and entered the ſchool of Ciro Ferri, under whom he ſtudied two years, and acquired not only great command of the pencil, but a fine taſte for deſign. He was recommended by his maſter to the grand duke Coſmo III., for whom he copied the pictures of Pietro da Cortona, in the Pitti palace; in which he ſucceeded ſo well, that the duke rewarded him very handſomely. He was likewiſe honoured with knighthood by the emperor Leopold, and had many other favours conferred on him by the great.

The ſtyle of Naſini bears ſome reſemblance to that of Paul Veroneſe. He died at Sienna in 1736, aged ſeventy-ſix. We have one ſmall upright etching by this artiſt, repreſenting “The Virgin with the Infant Chriſt and St. John,” from a compoſition of his own.

Cæſar Fantetti was born at Florence A.D. 1660. The time of his deceaſe has not been recorded, and of the events of his life it is only known that he worked at Rome after various Italian maſters.

He engraved, in conjunction with Pietro Aquila, the paintings in the Vatican, known under the name of Raphael's Bible; the firſt thirty-ſix, and the fortieth, are etched by him, and the remaining fifteen by P. Aquila. Fantetti alſo engraved “Chriſt praying in the Garden of Olives,” in folio, from L. Caracci; “Charity, with Two Children,” from Ann. Caracci; “Latona inſulted by Niobe,” in large folio, from the ſame painter; “The Death of St. Ann,” of the ſame ſize, from Andrea Sacchi; and “Flora ſurrounded with Cupids in the Air,” from Ciro Ferri; in an oval of folio ſize.

Franciſco Bruni was a native of Genoa, and an engraver. He was born in the year 1660, and died in 1726, but we are not acquainted with the particulars of his life, and we only know of the following print by him, “The Aſſumption of the Virgin,” in large folio, from Guido.

Lodovico Mattioli was born A.D. 1662, at Crevalcone, in the principality of Maſſeran, and died at Bologna in 1741. At an early age he was ſent to ſtudy in the ſchool of Carlo Cignani. He drew with a pen in a very pleaſing ſtyle; and etched from his own compoſitions and thoſe of the Caraccii, and other great maſters, but eſpecially after G. M. Creſpi, with whom he contracted a very intimate friendſhip. Among the etchings of Mattioli, the following will be found moſt worthy of notice: a landſcape, with ruins and figures, in quarto; “The Annunciation,” from L. Caracci, of the ſame ſize, a very rare print; “The Circumciſion,” in folio, from the ſame; “The Nativity,” from Aug. Caracci, of the ſame ſize; “The good Samaritan,” from Ann. Caracci; “The Death of St. Joſeph,” from Franceſchini; “The Martyrdom of St. Peter,” from Creſpi; a figure of “St. Anthony,” and another of “St. Vincent Ferreri,” all of folio ſize, from Creſpi; “St. Luke,” a note of invitation engraved by Creſpi, and re-engraved by Mattioli. And the figures for the poem of Bertoldo con Bertoldine, in twenty ſheets, were drawn by Creſpi, and engraved under the direction of Mattioli.

William da Leone was born at Parma in the year 1664. He etched, from his own deſigns, two ſets of animals, which are executed in a ſpirited ſtyle, and with ſome taſte; we are able only to ſpecify, in addition to theſe, the following engravings by Leone; two landſcapes, with animals, in quarto, and "Venus blinding Cupid," from Titian, in folio.

Luca Carlevariis, ſurnamed Zenobio, was born at Udino, in Italy, A.D. 1665, and died at Venice in 1729. He excelled in painting landſcapes and marine ſubjects. He likewiſe engraved a ſet of views of Venice, conſiſting of one hundred large plates lengthways, which were publiſhed in 1705. His prints are ſlight, but bold and ſpirited etchings; and give us clear ideas of the places they are intended to repreſent. We can only ſpecify the titles of the following two: a view of the church of St. Nicolas de Caſtello, at Venice; and one of St. Marie Formoſa, at the ſame place, both in folio.

Of the family of CRESPI we have already ſpoken, as ſee that article. Gioſeffo Maria employed a long life of upwards of fourſcore years, in the practice of the various arts of which imitation is the baſis, in the courſe of which he etched ſeveral plates, which do credit to his general reputation, and which we omitted to mention in vol. x. Among them we venture to recommend the following as moſt worthy of the notice of the connoiſſeur.

A grand compoſition, in large folio, of "The Maſſacre of the Innocents;" two folio plates in the manner of Rembrandt, of which "The Reſurrection" is the ſubject; "The miraculous Crucifixion of Piſtoia;" "St. Anthony," alſo in the manner of Rembrandt, and of the oval form; a folio plate of "Two Shepherds," one of them aſleep, and the other making the ſign of ſilence. A ſet of five, in the taſte of Salvator Roſa, of various mechanical occupations; and a very rare portrait of Michael Angelo Tamburini.

Pietro da Pietri, or Pitri, was born A.D. 1665, according to ſome authors, at Rome; others place his birth at Premia, in the Milaneſe territory. He learned the principles of art of Joſ. Ghezzi and Carlo Maratti, who employed him in copying ſome of the principal works of Raphael, and other celebrated Italian maſters. He died at Rome in the year 1716.

Notwithſtanding that Pietri employed great part of his time in copying, we have ſeveral meritorious hiſtorical pictures by him from his own compoſitions; thoſe eſpecially, which he painted for the church of St. Clement at Rome. He etched ſome few plates, and among them the two following will probably be found moſt worthy of notice. "The Aſſumption of the Virgin," a middling-ſized upright; and "St. Lawrence the Juſtinian," a ſmall upright, both from his own compoſitions.

Franceſco Antonio Lorenzini, known by the name of brother Antonio, was born at Bologna A.D. 1665. He was an eccleſiaſtic of the order of St. Francis; but turning his mind to the arts, he firſt ſtudied painting under Lorenzo Paſinelli: being, however, better pleaſed with etching, he was induced to throw aſide his pencils for the love of aquafortis and copper.

In 1699 he travelled to Florence, where he engraved great part of the plates for the gallery of the grand duke of Tuſcany, in conjunction with Theodore Ver-Cruys, Coſmo Mogalli, and Fichianti; and during his abſence from Bologna, he was agreeably ſurpriſed by finding himſelf elected a member of the Clementine academy. Lorenzini was a very induſtrious man, and left a great number of prints from different maſters: which, however, it muſt be acknowledged do him no great credit as an artiſt; among them the following are the beſt: "Moſes ſtriking the Rock," a large plate lengthways, from Baſſan; "St. Anthony of Padua performing a Miracle," from Paſinelli; "The Martyrdom of St. Urſula and her Companions;" "St. John preaching in the Deſert," all of large folio ſize, from Paſinelli; "Jeſus Chriſt in a Glory," with other figures, from L. Caracci; "The Virgin and Child," half figures, from Aug. Caracci, both in folio; "The Beatification of St. Dominic, accompanied by Jeſus Chriſt, the Virgin, and Angels," from Guido, a large circular plate; "St. Philip Neri kneeling before a picture of the Virgin, ſurrounded by Angels," from Carlo Maratti; "St. John in the Clouds, ſurrounded by Angels," from Correggio, both in large folio; "The Annunciation," from Paul Veroneſe, in large folio; "The Baptiſm of our Saviour," of the ſame ſize; "The Reſuſcitation of Lazarus," on three large plates, all from Paul Veroneſe; "Jeſus Chriſt on the Sea with St. Peter," from L. Cordi; "The Conſtruction of Noah's Ark," from Jac. Baſſano; "Venus with Two Cupids," from Carlo Cignani; "St. Auguſtino in the Air, ſurrounded by Rays of Glory," from Tintoret, all of large folio ſize; "Joſeph ſold by his Brethren," after Andrea del Sarto, in two large folio leaves; "Joſeph in Egypt;" "Saul and David with the Head of Goliah," from Guerchino; "The Pilgrims at Emaus;" "St. Peter delivered from Priſon," both from the ſame painter, all in folio; "The Holy Women at the Sepulchre," from P. de Cortona, a circular print; and "St. Margaret of Cortona, to whom the Virgin appears in the Clouds," from Gab. Caliari, in large folio.

The monogram of Antonio Baleſtra will be found in our *Plate* III. of thoſe uſed by the *Italian Engravers*. Of the leading events of his life we have already treated. (See BALESTRA.) His ſtyle of etching was bold and maſterly, though ſlight; and his moſt eſteemed prints are, a warrior's head, and two ſoldiers, both ſmall plates; "The Holy Virgin ſeated in the Clouds, with the Infant Jeſus and St. John, the Heads of three Cherubs appearing above;" "The three Angels viſiting Abraham;" a vignette inſcribed "Verona fidelis," all ſmall uprights, and rare. His portrait of the architect Michel San Michell, ſurrounded with allegorical alluſions, and marked with the engraver's monogram, is in ſmall folio.

Benedetto Lutti was an eminent painter of Florence, who ſometimes amuſed himſelf with etching, and whoſe works are generally and juſtly eſteemed. He was born in the year 1666, ſtudied under Antonio Domenico Gabbiani, and died at Rome in 1724.

Strutt ſays of this artiſt, that his merits procured him, from the elector of Mentz, the honour of knighthood, accompanied by a preſent of a croſs enriched with diamonds, but ſpecifies only two of his etchings, both of which are become extremely rare. The ſubjects of theſe etchings are, a landſcape after Guercino, in ſmall folio; and "The Crucifixion, with St. John and Mary Magdalen at the Foot of the Croſs," a ſmall upright, from a compoſition by Lutti himſelf.

Coſmo Mogalli was a native of Italy, and the diſciple of Giovanni Battiſta Foggini, a Florentine ſculptor. He was born at Florence in the year 1667, and died in the ſame city in 1730. He worked in conjunction with Antonio Lorenzini, (of whom we have recently treated,) and other engravers, on the plates from the Florentine gallery, for the duke of Tuſcany. We likewiſe have by him many plates for a book of Etruſcan antiquities, publiſhed by Thomas Dempſter, at Florence, in 1724.

The following prints, from the Florentine gallery, are from the graver of the elder Mogalli, *viz.* "A Holy Family, or the Repoſe in Egypt," from Albano, a circular print in folio; another "Holy Family," from Correggio, of the ſame ſize;" "The Supplication of Marſias," from Guercino, in large folio; "Eve preſenting the Apple to Adam," from Gabr. Caliari, in folio; "The penitent

Magdalen tranſlated to Heaven by an Angel," from Caracci, in large folio; "Adam and Eve diſmiſſed from Paradiſe," from Caliari, in folio; "St. Benedict inſtituting his monaſtic Order," from P. Veroneſe; "Jeſus Chriſt at the Table with the Pilgrims of Emaus," from Palma the elder; "The Marriage of St. Catherine," from Fra. Bartolomeo, all in large folio; "Virtutes Amor et Numen," an allegorical figure from Riminaldi, in folio; "David and Bathſheba," from Fr. Salviati; this and all the following are in large folio; "The Annunciation," from And. del Sarto; "The Adoration of the Shepherds," from Titian; a bacchanalian dance by four figures; and Philip II. king of Spain, alſo from the ſame painter.

Nicolas Mogalli was the ſon of Coſmo, and alſo an engraver. He was born at Florence in the year 1723, from whence, either for improvement or patronage, he travelled to Rome, where he engraved, with moderate ſucceſs, from the cabinet of Portici, and the plates, after the deſigns of Caſanova, for "Les Monumenti antichi inediti ſpiegati et illuſtrati da Giovanni Winkelmann," a folio work, which was publiſhed at Rome in the year 1767.

Jacques Maria Giovanni, or Juvanus, was born at Bologna in the year 1667, and died at Parma in 1717. He was the diſciple of Antonio Roli, and became a painter of ſome eminence. He alſo practiſed engraving and etching, and executed many large works from L. Caracci and Correggio. The moſt conſiderable work he engaged in was a cabinet of medals for the duke of Parma, in ſeveral folio volumes. His prints are of very unequal merits. As far as they can be ſpoken of generally, they are executed with tolerable care and ſkill, but are deficient in chiaroſcuro, and more or leſs ſo in drawing. The beſt of them are engraved from the pictures of the cloiſters of St. Michael in Boſco, painted by L. Caracci, and other celebrated maſters of his ſchool, on 19 plates in folio; the cupola of the church of St. John of the Benedictines at Parma, repreſenting "The Aſcenſion of our Saviour," &c. &c. on 12 plates, from thoſe juſtly famed pictures by Correggio, which can now only be known by the engravings, the paintings themſelves being no longer in exiſtence; the Holy Virgin in a landſcape, with the Infant Chriſt in her arms, with St. Jerome and Mary Magdalen, the latter of whom is kiſſing the feet of the child (a ſubject commonly known under the name of "The Day of Correggio"); the Virgin ſeated on a pedeſtal with the Infant Chriſt, known by the name of "St. George," who is the principal figure, and by ſome eſteemed the chef-d'œuvre of Correggio; "St. Sebaſtian faſtened to a Tree with his Hands behind his Back," in folio, from Caracci; "Jeſus Chriſt giving the Communion to his Apoſtles," from Franceſchini, a very excellent print of large dimenſions, and of the upright form.

Andrea Procaccini was born at Rome in the year 1667, and was the pupil of Carlo Maratti. He became a painter of ſome celebrity, and was choſen by pope Clement XI. to paint the twelve prophets of the Old Teſtament, for the church of St. John de Lateran. In 1720, he was invited to Spain, with the title of painter to the Royal Cabinet. Here he painted ſeveral pictures for the royal palace, and died at St. Ildefonſe, A.D. 1734. We have ſeveral engravings by this maſter, both from his own compoſitions, and thoſe of other painters, among which the following few are ſelected as moſt worthy of the notice of the collector:—"The Diſciples at Emaus," from Raphael; "The Aſcenſion of our Saviour;" a large group of figures, with a youth carrying his father on his ſhoulders, both from Raphael; "The Birth of Bacchus;" "Diogenes throwing away his Cup;" and "Clelius and his Companions paſſing the Tiber," all from Carlo Maratti, and of folio dimenſions.

Giovanni Dominico Picchianti was born at Venice A.D. 1670, and was the ſcholar of J. B. Foggini, a ſculptor of ſome eminence. The productions of Picchianti have no great ſhare of excellence to recommend them, for he worked in a coarſe ſlight ſtyle, and his drawing is rather mannered than correct. He engraved many of the plates from the pictures in the grand Florentine gallery, in conjunction with Lorenzini, Ver-Cruys, and Mogalli; and likewiſe ſome portraits, among which are, thoſe of an unknown female, from Raphael, in folio, a whole length of Sebaſtian del Piombo, from Titian, and cardinal Bentivoglio, from Vandyke; thoſe of cardinals Louis de Roſſi and Julius de Medicis, on the ſame plate, are from Raphael, and all are of large folio ſize.

The beſt hiſtorical works of Picchianti are, "The Virgin ſitting on a Chair," or the celebrated Madonna della Sedia of Raphael; a half figure of "The Virgin, with the Infant Jeſus, and St. John," from Caracci, in folio; "Paying Tribute to Cæſar," commonly called "Il Chriſto della Monetta," from Titian; "The Virgin and Child," from the ſame painter; and "Agar returning to the Houſe of Abraham," from P. de Cortona, all of large folio dimenſions.

Franciſco Antonio Meloni was a native of Bologna, and born in the year 1670. At an early age he appeared fond of painting, and was accordingly placed under Franceſchini; but time diſcovered that his diſpoſition was not formed for the attainment of excellence in that art, and he then took up the graver with much better ſucceſs. He engraved chiefly from the pictures of his maſter, and other Bologneſe painters; but the latter years of his life were ſpent at Vienna, where he died in the year 1713. The following are reckoned among his beſt engravings:—"The Adoration of the Shepherds," a middling-ſized upright plate, from Carlo Cignani; and "Aurora," from a ceiling at Forli by the ſame maſter, both in folio.

Of the merits of FRANCISCO and PIETRO AQUILA we have already treated. (See thoſe biographical articles reſpectively.) But of artiſts ſo diſtinguiſhed it has been judged proper to ſubjoin, in this place, liſts of the principal works on which their reputation has been founded. The beſt of thoſe by the elder Aquila are "Saint Roſalie," from his own compoſition, in folio; "Mars binding his Arms to a Tree," in large folio; "Cardinal Caſini as a Capuchin," in folio; "Cardinal Joſeph Maria of Thomaſis," from P. Nelli, of the ſame ſize; "The Laſt Supper," from Albano, inſcribed "Unus ex vobis, &c." in large folio; the firſt vaulted roof of moſaic in the church of the Vatican, from Ciro Ferri; two cupolas, one in the chapel of the Holy Sacrament, the other in the church of St. Sebaſtian of the Vatican, from P. de Cortona; another cupola, from the ſame maſter, painted in the church of St. Philip of Neri, all large circular prints; a group of heroes, to whom Minerva preſents a crown of laurel, and Mars a ſword, a folio print, from And. Bonfigli; "The Battle of Conſtantine and Maxentius," from And. Camaſſei; and "The Triumph of Conſtantine," both very large; "The dead Body of Chriſt acroſs the Knees of his Mother, accompanied by Mary Magdalen and St. Francis," from Caracci, in large folio; "The Arrival of the Body of St. Helena announced by a Biſhop to the Virgin," in folio; "The Repoſe," where the holy Virgin is repreſented ſeated under a tree with the infant, and in the back-ground St. Joſeph on his aſs; "St. Peter's Bark," from Lanfranc, in large folio; a very large folio print of "Our Saviour in a Glory, with St. Ambroſe, the Virgin, and St. Charles Borromeus, kneeling," from a grand altar-piece by Carlo Maratti; the vaulted ceiling of St. Francis Xavier at Naples, painted by Paul de Mattheis, and engraved on three large plates, repreſenting that ſaint overturning Idolatry, Hereſy, and Mahometaniſm; "Venus in the Air, ſhewing *Æneas* his Arms faſtened to a Tree," from Pouſſin.

The following are by Pietro Aquila, from his own deſigns: "The Adoration of the Kings," in folio; "The Flight into Egypt," dedicated to B. C. de Vingtimilliis, in large folio; "A Holy Family, where St. John kiſſes the Feet of the Infant Chriſt," half figures, in folio; "A Combat of two Lions," inſcribed "Spe ſuſcitat Iras," in folio; a portrait of Livio Odeſcalchi, with ornaments, in large folio.

From other Italian maſters, Pietro has engraven "St. Luke," with the inſcription "Ferax cum feriunt," &c. after Lazaro Baldi, in folio; "The Sacrifice of Polixenes," from P. de Cortona, in large folio; "A Sacrifice of the Nymphs of Diana on their return from the Chace;" "The Rape of the Sabines;" and "The Triumph of Bacchus," four very much eſteemed prints, all from the ſame maſter, in large folio; a large ſubject on two plates of "The Battle between Alexander and Darius," from the ſame maſter; "Moſes defending the Daughters of Jethro, at the Fountain," from Ciro Ferri; "Moſes ſtriking the Rock," both in large folio; "The Holy Virgin appearing to St. Aleſio, who is repoſing on a Bed, crowned with Stars," a large circular print; "The Veſtals cheriſhing the ſacred Fire, by the Orders of Auguſtus," a large upright print, all from Ciro Ferri; "The Holy Virgin in Heaven with five Saints, canonized by Pope Clement X." from Carlo Maratti, in large folio; "The Triumph of Chriſtianity, repreſented by Religion ſitting on the Clouds, receiving the Homage of the four Quarters of the World," in large folio; "The Virgin ſitting to St. Luke for her Portrait," in folio, all from Carlo Maratti; "Death and the Holy Virgin, with the Apoſtles," from J. Morandi, in large folio; the Bible of Raphael, inſcribed "Imagines Veteris ac Novi Teſtamenti, a Raphaele Sanct. Urbin. in Vaticano pictæ Jo. Jac. de Rubeis ſumitibus," in fifty-five leaves. Ceſare Fantetti drew and engraved the firſt thirty-ſix ſubjects, and the fortieth; all the others are by P. Aquila. The Farneſe Gallery, with the ſtatues and ornaments, and a deſcription in verſe by J. P. Bellori, in twenty-five leaves, of large folio ſize; a room in the Farneſe palace, with the ornaments and inſcriptions, in thirteen plates, of folio ſize; "The Aſſembly of the Gods," painted in the garden of the prince Borgheſe near Rome, called "The Villa Pinciana," entitled "Deorum Concilium ab Equite Joanno Lanfranco Parmenſi, tum Spirantibus ad vivum Imaginibus, tum monocromatibus atque Ornamentis Artis," &c. on nine large folio plates.

Marco Ricci, the celebrated painter of landſcape and ruined edifices, (for whoſe biography and general merits, ſee the article RICCI,) performed ſome etchings about this period, of which the beſt are a ſet of twenty-three, entitled "Varia Marci Ricci Pictoris præſtantiſſimi Experimenta ab ipſomet auctore inventa delineata atque inciſa et a me Carolo Orſolini Veneto inciſore," &c. anno 1730, printed on folio paper, but of different ſizes and ſhapes. They are feeble in chiaroſcuro, and though not entirely taſteleſs, diſplay no great knowledge of the art of engraving.

Antonio Maria Zanetti was of a noble Venetian family, born in the year 1680, and died in his native city in 1757, according to Huber; but according to Strutt, he lived ten years longer. He acquired what is often termed a competent knowledge of drawing, at a very early age; and before he was fifteen, engraved ſome figures and ſome heads, which he dedicated to Dr. Mead, the celebrated Engliſh phyſician.

The works of Zanetti conſiſt of etchings and engravings in chiaroſcuro; and, in the eſtimation of our countryman Strutt, they "prove him to have been a man of *great genius* and *ſound judgment.*"

"Aſſiſted by his relation A. M. Zanetti the Younger, and other artiſts, he engraved and publiſhed a large number of prints, taken from the drawings of Parmegiano, Raphael, and other great painters, which he purchaſed at the ſale of the Arundelian Collection. They are divided into two ſets; and both together conſiſt of eighty-nine prints on copper and wood, with the portrait of Zanetti, engraved by Faldoni, from a painting by Roſalba."

We come now to what muſt be a reproach either on his "genius," or his "judgment," or on both. Strutt adds, that "in order to render this collection the more valuable, he burnt the wooden blocks from which the chiaroſcuros were printed, and deſtroyed the copper-plates, after he had taken off ſuch a number of impreſſions as he thought proper, which, we are informed, was by no means very large."

Now no principled engraver deſires that his works ſhould ever become rare from any other cauſe than the extenſive demand for them among the public; and the ſubſtitution of nominal for intrinſic value, is an expedient worthy only of traffickers in art, and which "great genius" and "ſound judgment" would equally diſclaim.

Zanetti reſided for ſome time in London, and engraved here a ſet of twelve ſtudies of heads, figures, &c. from his own drawings, which he tinted in a ſpirited ſtyle, and which, according to Strutt, do him great honour.

He alſo engraved in aquafortis another ſet of twelve plates, of which the ſubjects are animals and figures, after Caſtiglione; a ſet of the ſtatues which adorn the library and palace of St. Mark at Venice; and a ſet conſiſting of eighty plates of the engraved gems of antiquity. His cypher will be found in *Plate* III. of the monograms of the *Italian Engravers.*

Zanetti the Younger was nephew to him of whom we have juſt cloſed the account, and was born at Venice A.D. 1720; but the year of his demiſe has not been mentioned. He engraved in the taſte and ſtyle of his uncle, whom he aſſiſted in his work after the ſtatues at the palace of St. Mark, as well as in that after the drawings by Raphael, &c. which once formed part of the Arundelian Collection. And in the year 1760 he publiſhed an excellent work, adorned with eighty plates, engraved by himſelf, and intitled "Varie Pittore a freſco de principali Maeſtri Veneziani," &c.

Franceſco Fontibaſſo was born at Venice A.D. 1681. He learned drawing in the Roman academy, and ſtudied for a time under Seb. Ricci, whoſe ſtyle of painting he imitated with no inconſiderable degree of ſucceſs, in the pictures which he painted for the Duodo palace, and the church of St. Salvador. In the year 1769 he travelled to Peterſburg, with the view of bettering his fortune, where preſumptively he died, for we do not hear of his return.

He etched ſeveral plates with mediocre, but painter-like ability, among which are a ſet of ſeven whimſical ſubjects from his own compoſitions, in ſmall folio; and "The Holy Virgin appearing to St Gregory at prayer," an upright of the middle ſize, from Seb. Ricci.

Carlo Carloni, or Carlone, was born at the village of Scaria, in the Milaneſe territory, A. D. 1686, and died at his native place in the year 1775. He was of a numerous family, of whom the greater part were artiſts. His father was a ſculptor, and intended Carlo for that profeſſion; but finding he had more inclination to become a painter, placed him under Julio Qualio, under whoſe inſtruction he ſoon became remarkable for talent and induſtry, and occaſionally both painted and engraved. In his pictures he produced a rich and agreeable effect, and made ſome advances toward combining the merits of the Roman and Venetian ſchools. Of his engravings, of which we cannot ſay quite ſo much, the following are held in moſt eſteem: “A Holy Family, wherein St. John is kiſſing the Feet of the Infant Saviour;” and “The Miraculous Conception,” both of 4to. ſize; “St. Charles Borromeus adminiſtering to the Sick, during the Plague at Milan,” in folio; three plates of ceilings, in 4to., in one of which is a group of children with flowers; and the death of a ſaint, of folio dimenſions.

Andrea Zucchi was born at Venice in the year 1680, where he engraved a ſet of twelve plates of Venetian habits, and many other ſubjects for the libraries. In 1726, he was invited to Dreſden to paint theatrical ſcenes and decorations; and on his return to his native city he engraved moſt of the plates for the collection publiſhed by Loviſa, conſiſting in the whole of fifty-ſeven plates, from the moſt celebrated pictures at Venice; but his talents as an engraver never roſe above mediocrity. Among his beſt productions are, “The Angel Raphael conducting the young Tobias,” in large folio, from Titian; “St. John the Evangeliſt,” of the ſame ſize, from the ſame painter; “St. Barnabas Veſcova, St. Peter, St. John, and other Saints,” from the picture which D. Varotari painted for the church of St. Barnabas; “St. John the Baptiſt,” from P. Veroneſe; “The Martyrdom of Paul Erizzo,” from P. Longho; “The Nativity of the Virgin,” from a picture by Nic. Bambini; “Manna gathered in the Deſert,” from Joſeph Porta, a circular print; “Cybele on her Car drawn by Lions,” from a freſco by Tintoret; and “Eneas ſaving his Father and Son from the Conflagration of Troy,” after Seb. Ricci; all of large folio dimenſions.

Franceſco Zucchi was the younger brother of Andrea, under whoſe inſtruction he ſtudied the elements of art. In the year 1750, he was invited to Dreſden to paint for the electoral gallery, but was interrupted by the war, which obliged him to return to his native country, where he worked chiefly for the bookſellers. He engraved ſeveral of the plates from the pictures in the Dreſden gallery; among which the following will probably be found on the whole to deſerve a preference; the portrait of Eſpagnol, from Rubens; ditto of a woman who reſembles the firſt wife of Rubens, both in folio; ditto of Jacques Antonio Murani, from Jean da Antona, in an oval of folio ſize; “St. Helena worſhipping the Croſs,” from Bettini Cignarolli, in folio; “The Martyrdom of Religion,” an allegorical ſubject, in folio; “Religion and the Sciences contemplating the Portrait of a Cardinal,” in folio; and “Apollo with his Lyre,” ſurrounded with ornaments, of large quarto ſize.

Lorenzo Zucchi was the ſon of Andrea, and was born at Venice in 1704. When his father was invited to Dreſden, in the year 1726, Lorenzo accompanied him, and having been inſtructed in the elements of engraving, he continued to practiſe it in that metropolis with ſucceſs, and was honoured with the title of engraver to the court of Dreſden. Moſt of his productions are from the Dreſden gallery, and among them the following have been thought the moſt worthy of notice.

Portraits.—Herman Charles Keyſerling, count of the holy Roman empire, from Anna Maria Werner, in large folio; John Frederick, prince of Sapieha; Bonaventura Roſſi, painter to Auguſtus III.; Louis de Silveſtre, firſt painter to Auguſtus III.; L'Abbate Pietro Metaſtaſio, Poeta, &c. all of large folio ſize.

Various Subjects from the Dreſden Gallery.—“The ſeven Sacraments,” from Joſeph M. Creſpi; “The Martyrdom of St. Peter and St. Paul,” from Nic. del Abbate; (P. Tangi likewiſe engraved this picture, which engraving, as well as that of Zucchi, will be found in the collection from this gallery;) “St. Catherine receiving the Crown of Immortality,” after a copy by Eraſmus Quellinus, from Rubens; “A grand Sacrifice to Venus,” from G. Laireſſe; “The Supplication of Marſyas,” from J. B. Langetti, all of large folio ſize; and “The Archangel Michael precipitating the Dragon,” from Steff. Torelli; “St. Joſeph, with the Infant Chriſt in his Arms,” from Joſ. Angelli, in the gallery of the count de Bruhl; two landſcapes, entitled “Soggiorno paſtorale, and “Campagne aperta,” from Joſ. Roos; “The laſt of the Cæſars,” two half figures, one of which repreſents Titian, marked Tizianus f. L. Zucchi delin. et ſculp. engraved in the ſtyle of Pitteri; and “David with the Head of Goliah,” from L. Jordane, all of folio dimenſions.

Jerome Ferroni was born at Milan in the year 1687. He painted the death of St. Joſeph, for the church of St. Eſutorgio, and afterwards travelled to Rome, where he worked ſome time in the ſchool of Carlo Maratti, after whoſe pictures he etched the following ſubjects, in the ſlight ſpirited ſtyle of a painter, but with great taſte; “The Sun ſtanding ſtill at the Command of Joſhua;” “Deborah ſinging the celebrated Canticle, after the Victory over Siſera,” and “The Death of Siſera,” all in large folio; “The Chaſtity of Joſeph,” in quarto; and “Judith beheading Holofernes,” in folio.

Giovanni Antonio Faldoni, was born at Aſcolo in the year 1690. He learned painting under Antonio Luciani, and likewiſe practiſed engraving. Faldoni worked chiefly, if not entirely, with the graver, frequently imitating the ſtyle of Mellan with no inconſiderable degree of ſucceſs; on the whole, he merits the encomium of having been an artiſt of ability. His beſt prints are the portraits of the doges of Venice, the procurators of St. Mark; various antique ſtatues, making part of two volumes in folio, of Venetian antiques; part of the deſigns of Parmegiano, for the collection in two folio volumes publiſhed by Zanetti; a portrait of Antonio Maria Zanetti, from Roſalba, in folio; Marco Ricci, from Roſalba, in folio; “Sebaſtianus Ricci Bellunenſis Pictor, ſuæ ætatis facilé primus, annum agens LX.” in folio; “A Holy Family in a Landſcape, with Angels miniſtering,” from S. Ricci, in large folio; “The Conception of the Virgin,” from the ſame maſter; “The Nativity of our Saviour,” from P. de Cortona; “David playing the Harp before Saul,” from Joſ. Camerata the elder; “David flying from the Anger of Saul,” from the ſame maſter, all of folio ſize.

Antonio Baldi was a native of Cava, in the kingdom of Naples, and was born in the year 1692. He ſtudied the rudiments of painting under Solimene; and learned engraving of Magliar. He eſtabliſhed himſelf as an engraver at Naples, and engraved for the moſt part after Solimene, but occaſionally from his own compoſitions. The following are ſome of his beſt engravings; the portraits of the emperor Charles VI. in an oval of folio ſize; Don Carlos, king of the Two Sicilies, of the ſame ſize and form; Nicholas Cyrillus, a phyſician; Maria Aurelia Carraccioli, a nun; St. Ignatius of Loyola, in an oval, with acceſſories; and Raphael Manca, accompanied by an angel, alſo in an oval; “The Communion of St. Mary the Egyptian,” inſcribed

“ Divæ Mariæ ;” “ St. Philip of Neri, in Heaven before the Trinity,” inſcribed “ Cui nomen dedit alma Trias ;” “ St. Emigde, interceding for the Neapolitans,” inſcribed “ Divo Emigdo in terræ motum, et Neopolis Patrono ; and “ St. Gregory the Martyr, with the Subjects of his Miracles,” all of folio dimenſions.

Andrea Magliar was born at Naples in the year 1692. He engraved from the pictures of Solimene and other maſters, but is very little known, and we are not able to ſpecify any of his works. His ſon, Gioſeffo Magliar, was the diſciple of his father and of Solimene; and great expectations were formed, from the early ſpecimens which he gave of his abilities, but he died young. There is a print by him, of “ Chriſt appearing to St. William,” of folio ſize, from Solimene, which certainly is a work of conſiderable promiſe.

Giovanni Dominico Campiglia, was born at Luques in the year 1692. At Florence he became the pupil of Thomaſo Redi, and Lorenzo del Moro ; and at Bologna he ſtudied in the ſchool of Gioſeffo del Sole. He drew moſt of the ſtatues, buſts, and portraits of the Florentine gallery, and compoſed the typographical ornaments for that work. Campiglia was invited to Rome, where he did the drawings of the ſculptures of the Capitol, the firſt volume of which appeared in 1741. He has etched a great number of plates, with ſome taſte, and among them the following portraits ; Giovanni Lorenzo Bernini, Julio Romano, Salvator Roſa, Leonardo da Vinci, and Giovanni Antonio Razzi ; all of folio dimenſions.

Giovanni Batiſta Tiepolo, was born at Venice in the year 1697, and died at Madrid A.D. 1770. In his youth he frequented the ſchool of Gregory Lazarini, and after having worked at Milan, and in other parts of Italy, he travelled to Germany, and painted, in the epiſcopal palace of Wurzburg, the hall, the ſtaircaſe, and two altar pieces. He afterwards went to Spain, and painted in conjunction with Mengs, who became jealous of him ; but for the detail of his merits in this art, ſee the article TIEPOLO.

Tiepolo engraved fifty-ſix ſubjects in a very ſuperior ſtyle, exceedingly neat, and with taſte, correctneſs, and ſpirit, from which the following are ſelected. “ The Adoration of the Kings,” in folio, from his own compoſition, which is generally regarded as his chef-d'œuvre. A ſet of fancy ſubjects, conſiſting of twenty-four plates, in quarto. And another ſet of fancy ſubjects, in ten plates, ſmaller than the foregoing. All from his own compoſitions.

Govanni Domenico Tiepolo was the ſon of the preceding artiſt, and was born at Venice A.D. 1726. He learned the principles of drawing and painting of his father, and in 1745, painted the figures of the cupola of the church of St. Fauſtin, and St. Jovita at Breſſe.

He alſo occaſionally took up the etching point as his father had done, working ſometimes in a ſtyle which bears reſemblance to the etchings of Caſtiglione, and on other occaſions in that of his father. His beſt prints are, a ſet of twenty-ſeven ſmall plates, lengthways, repreſenting, in ſeries, “ The Flight of the Holy Family into Egypt ;” a ſet of twenty-ſix heads, of the ſame ſize, executed in the ſtyle of Caſtiglione ; “ The Way to the Croſs, or the Hiſtory of the Crucifixion of our Saviour,” in fourteen plates of quarto ſize ; “ The Miracle of St. Francis ;” “ The Miracle of St. Jerome,” both in quarto ; “ The Republic of Venice receiving the Riches of Neptune,” an allegory, in folio ; “ The Virgin in the Clouds appearing to St. Thereſia, and two other female Saints ;” and “ St. Ambroſe preaching to the People,” both in large folio. The whole after the deſigns of the elder Tiepolo.

Lorenzo Tiepolo, brother to the above-mentioned artiſt, was alſo a painter, and etched in a ſtyle, and with a degree of taſte which appears hereditary, from the deſigns of his father.

Giulio Giampicoli, or Jampiccoli, was born at Venice A.D. 1700. We are ignorant under what maſter he learned engraving, but his ſtyle greatly reſembles that of the ſchool of Wagner. He mingled etching with the work of the graver, and engraved both hiſtory and landſcape with ſucceſs ; the following few may be reckoned among his beſt productions. A ſet of thirteen landſcapes, from Marco Ricci, in large folio. A ſet of paſtoral ſubjects in four plates, each being inſcribed with ſix Italian verſes ; and four landſcapes after Marco Ricci, and F. Zuccarelli, in large folio.

Franciſco Polanzani, or Polanſani, was born at Andale, near Venice, A.D. 1700, and reſided at Rome. The moſt conſiderable work we have by him, is a ſet of twenty-two plates, of which the ſubjects are from the life of the Virgin, either after Pouſſin, or, more probably, from Jacques Stella (to whom Baſſan attributed them). The following may alſo be reckoned among his beſt productions. The buſt of a female, from C. Cignani. A buſt of a blind muſician, from Marco Benefiali. “ Mater amabilis,” from Joſ. Nogari. Two other ſubjects from the ſame maſter, an old Man with a Bag of Money ; and an Old Woman with a Hand Granade, all of quarto ſize. And “ An Old Woman warming herſelf over a Chafing-diſh ;” from the ſame painter, in folio.

Giovanni-Batiſta Pittoni, was born at Vicenza in 1690, and died at Venice A D. 1767. He was the nephew and diſciple of Franciſco Pittoni, the Venetian painter, and his hiſtorical pictures are held in conſiderable eſteem. There are ſome few etchings by this painter which are much valued by connoiſſeurs, and are marked ſometimes with his initials, or at others Batiſta P. V. F. and ſometimes with his name at full length, but we are unable to ſpecify any of them.

Antonio Luciani was a native of Venice, and born A.D. 1700. He ſtudied painting under Jacques Piccini, though he is better known as an engraver than as a painter. Luciani engraved from the works of Tiepolo, Caſſana, Bombelli, and others, but his works are held in no very high degree of eſtimation, and it may therefore be ſufficient to ſpecify the two following prints by him. The portrait of cardinal Sforza Pellavicini, from Pietro Avogrado ; and that of the Jeſuit Tambarini, from the ſame painter, in folio.

Dominico Roſſetti was born at Venice in the year 1700. The prelate Giovanni Franciſco Barbarigo, being very fond of this artiſt in his youth, took him to Verona, where he purſued his ſtudies for ſome time. He practiſed architecture, as well as engraving both on copper and wood, and when ſome years had elapſed, and his reputation was eſtabliſhed, Roſſetti was invited to Duſſeldorp, by the elector palatine, to engrave “ The Triumph of Alexander,” from G. Laireſſe, on twelve large plates, which is become exceedingly rare, becauſe, before many impreſſions had been printed, the elector had the plates gilt. This artiſt alſo engraved ſeveral of the plates for the collection of prints taken from the moſt capital pictures at Venice, which was publiſhed by Domenico Loviſa, and among which the following will probably be found moſt worthy of the notice of the connoiſſeur.

“ Pope Alexander III. recognized by the Doge of Venice,” after Paolo Veroneſe ; “ The Ambaſſadors ſent by the Venetian Senate to the Emperor Frederic Barbarouſſa,” after the pictures of Carlo and Gabriel Cagliari, which are preſerved in the hall of the grand council chamber at Venice.

Another print, of which the ſubject is taken from the ſame embaſſy, after Tintoret, whoſe picture is alſo preſerved in the ſame public hall; “The great Victory gained by the Venetians over the Imperialiſts,” from the ſame maſter; “The Pope beſtowing his Benediction on the Doge Zanii, previous to his Battle with Barbarouſſa,” after Franceſco Baſſano; “The Emperor Barbarouſſa proſtrate before Pope Gregory VIII.,” after Frederico Zucchero, and another with the Italian title “Othone vien licenziato dal Pontefice e dal Doge perche vada al trattar la pace con l'Imperadoſe ſuo Padre,” alſo after Zucchero.

The portrait of Thomaſo Sennachio, (a celebrated phyſician,) after S. Bombelli, is alſo engraved by Roſſetti; and all the above are of large folio dimenſions.

The names of ſome few of the engravers of Italy, who run their obſcure and unintereſting careers about this period, have been purpoſely omitted, as being altogether unworthy of our records. Indeed, when we reflect on the advantages poſſeſſed by the artiſts of Italy, compared with thoſe whoſe inferior fortune it is to exiſt in the other countries of Europe, we cannot but feel ſome ſurprize that in the courſe of the century through which we have juſt laboured with due obedience to chronologic order, ſo few engravers who are juſtly entitled to rank high in their profeſſion, ſhould have appeared in that highly favoured country. While France, Germany, and the Low Countries, with inferior opportunities, preſent a reſpectable diſplay of talent in this art, and are even brightened with ſome rays of original genius, the hiſtory of Italian engraving is little better than a dull record of creeping mediocrity.

If the reader participates in our ſurpriſe, he will perhaps be led to reflect whether this effect may, with more juſtice, be aſcribed to dearth of that particular kind of genius combined with patient aſſiduity which is required to excel in this art? or to paucity of Italian patronage? or that no philoſophical view was then and there taken of the principles and practical energies of engraving, though painting and the art of the ſtatuary were abundantly honoured with the literary attentions of their Italian profeſſors and critics? or laſtly, how far it was owing to the circumſtance of engraving being leſs ſtudied and practiſed in Italy, as a diſtinct profeſſion from that of painting, than in the north of Europe?

The name and the works of Piraneſi, which we now approach with all the refreſhing pleaſure with which wearied attention is inſpired by the appearance of a worthy object, may ſhed ſome ſalutary light on the diſcuſſion of theſe queſtions, or will at leaſt prove that the genius of Italian engraving had not fled for ever to leſs genial climates.

Giovanni Batiſta Piraneſi, was born in the Roman territory early in the eighteenth century; Huber ſays in the year 1707, and died in the city of Rome in 1778. He was at once architect, antiquary, draughtſman, and engraver, and in all, but more particularly in the latter art, evinced the moſt vigorous and original powers. He appears to have had no tutor, at leaſt none has been mentioned by his biographers, and excepting a ſound mathematical foundation, with which books or a maſter muſt preſumptively have ſupplied him, he built his ſtyle of engraving on his own ſtrong and keen obſervation of nature. In his practical knowledge of perſpective, as in his treatment of ruined edifices, he had no predeceſſor, and though he will always have numerous imitators, he has yet met with no rival in Italy, nor even in Europe, ſave and except our own Edward Rooker, and another, whom, with ſtill more propriety, *we Cyclopedians* may call our own.

The authors of the French Encyclopedie ſay of Piraneſi, that he was the beſt draughtſman of ruins, and the moſt pictureſque engraver that the country produced. This is no cold praiſe, though not warm enough for the ardour of the ſubject. His profeſſional induſtry was unremitting, yet his mind and his hand have ſo far outſtripped time, that though we know this, we remain in aſtoniſhment at the vaſt quantity of his works, which, when their number and magnitude are taken together, exceed the productions of any other engraver whatever. A pile of more than twenty large folio volumes, replete with taſte and intelligence, ſeems too much to have been produced by the labour of a ſingle individual, even after we have made ourſelves acquainted with the rapidity of his powers; yet all theſe are etched from drawings made by himſelf, and ſome of theſe drawings, of which the ſubjects are the Greek temples at Pæſtum, and which atteſt the vivid feeling and maſterly powers of execution which Piraneſi poſſeſſed in that branch of the art, are now in this country, having been purchaſed within theſe few years in Italy, by Charles Lambert, eſq. of the Inner Temple.

Towards the middle period of his life, or rather before, our engraver became a member of the Roman academy of arts, but on account of ſome feuds, with the merits of which, if any merit attached to them, we are not acquainted, he was expelled by the voice of the majority of academicians. After ſome few years, however, had elapſed, and animoſity was cool, motives were explained, or miſtakes were diſcovered, and Piraneſi was honourably invited by his brother artiſts to return. He was, about the ſame time, perhaps to give the greater eclat to his return, created a Roman knight, but was always better known by his name than his title.

Of many irrefragable proofs that might be adduced to render idle the ſophiſms of thoſe who aſſert that engraving is not an *original* art, Piraneſi is one, having never, to the beſt of the preſent writer's knowledge, engraved after any other pictures or drawings than were the production of his own hand, which ſometimes preſent us with the magnificent remains of ancient Italy, and are ſometimes the ready offſpring of a mind ſtored with architectural wonders.

Wherefore, unleſs thoſe arts which are capable of independent exiſtence, might juſtly loſe their claim to originality, by condeſcending to copy, where the general and inſeparable intereſts of art and ſociety require ſuch condeſcenſion, no man, and no privileged body of men, ſhould ſay of engraving that “it is not an original art,” for no man of ſenſe denies originality to a picture, becauſe a ſketch or cartoon of the ſame ſubject has previouſly exiſted, nor to the art of the ſculptor, becauſe he models in clay before he chiſels in marble.

Though the human figures which he introduced into his landſcapes, are extravagant in their attitudes, and ill drawn, they act the parts which they were intended to act; they ſerve to ſhew that the ſcenes he has repreſented were inhabited (if not by whom), and they are a ſcale whereby he induces the ſpectator unwittingly to meaſure the relative magnitude of thoſe edifices which were the real and the oſtenſible objects of his art. In his characteriſtic treatment of thoſe edifices, and of the vaſes and other ornamental remains of antiquity, his line, varying as occaſion admitted or required, was peculiarly expreſſive of ſtone, bronze, ſtucco, brick, and all the various materials of which Greek and Roman ſculpture and architecture conſiſt, diſcriminating with exquiſite obſervation and inimitable ſkill, whether thoſe materials retained their original ſharpneſs of workmanſhip, or were mouldered by the hand of Time; or ſtained by the weather; or ſplit and cracked by the froſt, by Vandal barbarity, or other ſudden caſualty; and whatever his ſubject, he always ſeems to have worked with eaſy vigour, with unlimited freedom of hand, and as if "out of the abundance of his heart."

Trees do not often occur in the prints of Piraneſi, but when they do, they in moſt inſtances too much reſemble ſea-weed: yet the wild raggedneſs and unexpected forms which characterize both theſe and the clouds which float over his landſcapes—and even his ill-drawn figures—have a certain air of enterprize, which accords with the forceful and chivalrous character of his chiaroſcuro, and rather augments than diminiſhes, the general ſentiment of romantic magnificence, which many of his compoſitions, and more eſpecially the large frontiſpieces which fold into his large folios, inſpire.

In ſome of the latter, all the grand architectural forms of Egypt, Greece, and Italy, appear to be aſſembled, as if by magic, and the mind of the ſpectator is led to wander, in poetic reverie, through irregular avenues of obeliſks, ſarcophagi, pyramids, columns, and triumphal arches. In others, which are of ſubterraneous character, the author appears to have penetrated the cemeteries of departed greatneſs, and here, monſtrous and forbidden things, are crawling and twining their ſlimy convolutions among mouldering bones, broken ſculpture, and mutilated inſcriptions, and an air of dankneſs and dilapidation, and ſepulchral gloom, is diffuſed through the cavern, as if Time and Envy were beckoning to Oblivion, to break down what remained of the trophies of the brave, and obliterate the wiſdom of the wiſe.

In his technical proceſs, Piraneſi was the firſt engraver who made free and abundant uſe of the ruler, as may be ſeen in his interiors of St. Peter's cathedral, his antique vaſes, and ſuch other ſubjects as required it, or as admitted it only in certain parts; for he ſometimes artfully contraſted, in the ſame plate, the wildeſt ſallies of the etching-point, in the broken or weather-ſtained parts of his lights, with ruled paſſages in his ſhadows, where the utmoſt regularity and perſpicuity were preſerved. Thought always accompanies his deeds, even where he ſeems moſt careleſs. The reflex lights of a bright climate might ſeem, to the inconſiderate in a humid one, to partake of flimſy tranſparency. In the works of Piraneſi, they ſhew the juſtneſs of his obſervation. If he was ſtimulated by an adventurous ſpirit, he was reſtrained by judicious caution, which ſat ſo eaſy on him, that he exerted it without the leaſt ſeeming effort. In ſhort, with the ſkill and conduct of a brave general, it was his to vary and adapt his mode of execution, and qualify his proweſs, by the nature of the occaſion which called it forth: he uſed the graver with boldneſs when he did uſe it, but uſed it only as an auxiliary to his etching. He knew that this was the main body of his native force, on which he could moſt depend. He doubtleſs felt that he was here the Alexander of his art, and that none could here, with any hope of ſucceſs, diſpute with him for the palm of victory.

To ſpeak of the works of this artiſt in detail, would fill a volume: it muſt therefore here ſuffice to ſay, that among the beſt of them will be found the frontiſpieces or title pages to his large volumes of Italian antiquities, conſiſting, for the moſt part, of very rich compoſitions, formed of the fragments and monuments of antiquity. Several views of the Coliſeum and arches of Conſtantine and Septimius Severus, at Rome; the pyramid of Ceſtius, with other Roman antiquities; the tomb of Cecilia Metella, on the Appian way; the fountain of Bernini, with the ſurrounding edifices; the façade of the Baſilicum of St. Mary, with other buildings; ditto of St. Lorenzo on the Tiburtinian way; (an admirable mixture of regular with irregular mode of execution, in the treatment of the architecture;) interior and exterior views of the Pantheon of Agrippa; a very large and magnificent view of the Sybil's temple at Tivoli; another view of the ſame temple, ſomewhat ſmaller; another, with the caſcade at Tivoli; the bridge and caſtle of St. Angelo; the Ponte Mola; the ſquare of the Capitol; the ſquare of Monte Cavallo; the grand fountain of Trevi, and the temple of Jupiter Tonans; all of large folio dimenſions, and ſome of them ſo large as to fold into his imperial folios.

Franciſco Piraneſi was the ſon of Giovanni Battiſta, and was born at Rome in the year 1748. He became an engraver of landſcape and ruined buildings, in which he imitated the ſtyle of his father, but, like other followers, was always behind, though his engravings of this kind poſſeſs ſo much merit, that were his father's works annihilated, he would be entitled to hold rather an high rank in his profeſſion. Franciſco did not, however, confine the exerciſe of his talents to landſcape and architecture, but engraved ſeveral plates of the celebrated ſtatues of antiquity. He drew the human figure better than his father, but in his treatment of the antique was ſtill an imitator, following, with much devotion, the ſtyle of engraving of Pitteri, of whom we ſhall preſently ſpeak.

Among the beſt of his prints are views of the Coliſeum, the Pantheon, the baths of Salluſt, the baths of Diocleſian, and the temple of Iſis at Pompeia, all in large folio; and in very large folio, the illumination of the chapel of Paulina, in St. Peter's cathedral; and among his ſtatues the following are entitled to reſpectful notice, *viz.* the ſitting Jupiter of the Muſeum Clementinum, the Venus de Medicis, the group of Cupid and Pſyche, from the gallery of the Capitol, and Oreſtes recognized by Electra, miſtakenly called by ſome the young Papirius and his mother, from the original ſculpture in the Villa Ludoviſa, all of large folio dimenſions.

Laura Piraneſi, was the ſiſter of the preceding artiſt, with whom ſhe equally diſtinguiſhed herſelf by engraving: the following views are by her hand, *viz.* the Capitol of Rome, the bridge of Salario, the temple of Peace, and the arch of Septimius Severus, all of 4to. ſize.

Giovanni-Marco Pitteri, was born at Venice A. D. 1703, and died in the ſame city in 1767. He ſtudied engraving for a ſhort time under Joſ. Baroni, whom he ſoon quitted for J. A. Faldoni. The works of this admirable artiſt are executed in a very remarkable ſtyle, with ſingle courſes of lines, though very differently diſpoſed from thoſe of Mellan and his followers. They run perpendicularly from the top to the bottom of the plate, and the ſhadows are expreſſed by ſtrengthening them as occaſion required. The effect he has produced in this new mode of engraving is far more pleaſing and harmonious than could have been expected, eſpecially where, by partially notching his lines, he has imparted ſtony character and richneſs, to ſuch parts of his prints as required it. This artiſt, being always occupied with engraving, never travelled out of his native place.

Among his works, the following are moſt worthy of notice.

Whole-length Portraits and Heads, all in large Folio.—A buſt of himſelf, from Piazzetta; a buſt of J. B. Piazzetta, a Venetian painter; Charles Goldini, a Venetian comic poet; John Mocenigo, a Venetian nobleman; Joſeph Nogari, a Venetian painter, with his hand on the hilt of his ſword; and a young lady reſting her head on her hand, all from the ſame painter; count de Schulenbourg, field-marſhal of the republic of Venice, from C. F. Ruſca; cardinal Quirini, marquis Scipio Maffei, Clara Iſabella Fornari; and a ſet of heads on ſixteen plates, which are preſumptuouſly entitled God the eternal Father! our Saviour, the Virgin Mary, the twelve apoſtles, and St. Paul, all from

Piazzetta, according to Huber, but, according to Strutt, the latter are from his own deſigns.

Various Hiſtorical Subjects.—“ Chriſt expiring on the Croſs,” with the effect of night; “ Religion and Hereſy,” an allegory, both from Piazzetta; “A Holy Family,” from Pietro Longhi, in large folio; ſeven folio upright plates of the ſacraments; ſix large folio plates repreſenting chaces in the neighbourhood of Venice, from the ſame maſter; “ St. Peter delivered from Priſon by an Angel,” after Eſpagnoletto; “ The Martyrdom of St. Bartholomew,” from the ſame maſter, both in folio, for the Dreſden gallery; “ St. Catherine of Sienna,” after J. B. Tiepolo; “ The Penitent Magdalen,” from the ſame, for the Dreſden gallery; “ The drunken King,” after D. Teniers; and two ruſtic ſubjects, after the ſame painter, (the Shoe-maker, inſcribed “ Ne ſutor ultra crepidam,” and the Miller, inſcribed “ Sudat rotator ſua ſorte contentus,”) all in large folio.

Comte Pietro de Rotari was born of a noble family at Verona in the year 1707, and having a natural turn for the fine arts, together with the means of indulging it, became ſucceſſively the pupil of Robert van Audenarde and Antonio Baleſtra. He ſtudied with commendable aſſiduity, and travelled in queſt of improvement, or of diſtinction as an artiſt, to Venice and to Rome, and afterwards to Vienna, Dreſden, and Peterſburg, in the latter of which cities, after a reſidence of eight years, he ended his career in 1764.

His engravings conſiſt of ſlight, ſpirited, painter-like etchings, which are much ſought after by the curious, and are executed from his own compoſitions, or from thoſe of his maſter, Baleſtra. From among theſe, the following will probably be found moſt worthy of ſelection. The portrait of Filippo Baldinucci writing; “ St. Francis adoring the Crucifix,” a middle-ſized upright oval, from his own compoſition; “ The Education of the Holy Virgin,” of the ſame ſize; the head of an old man with a beard. Another head of an old man looking upwards, both in 8vo.; “ The Three Angels entertained by Abraham;” “ David with the Head of Goliah;” “ St. Jerome;” and “ The Interview between Venus and Eneas,” all of 4to. ſize; and, of ſomewhat larger dimenſions, three monks of the order of St. Francis, after Baleſtra. The count alſo arrived at ſome eminence as a painter of portraits and hiſtory.

David Antonio Foſſato was born at Morco, a bailiwick of Luggaris, in Switzerland, in the year 1708; but reſided at Venice with an uncle, who was a merchant, and wiſhed Foſſato to become one alſo, but finding he had more taſte for the arts, he gave up this deſign, and placed him under Vincent Mariotti, a good deſigner of architecture, and a maſter in perſpective, with whom he made great progreſs. He afterwards travelled to Vienna with Daniel Gran, under whom he executed ſome very fine pictures, particularly a very ſuperb ceiling for the Imperial library. He worked with great ſucceſs, both in oil and freſco, in moſt of the towns of Rome and Germany; and likewiſe amuſed himſelf with the point. Among his beſt productions in that way, the following may be reckoned. A ſet of twenty-four folio landſcapes of Venice and its environs, from M. Ricci, with a dedication to count Algarotti; “ Diana and Caliſto,” from Solimene; “ The Family of Darius before Alexander,” from P. Veroneſe; “Jupiter thundering againſt the Vices,” from the ceiling of the council-chamber; “ The Servant of Abraham with Rebecca,” half figures, from Ant. Bellucci; and “ The Vocation of St. Peter to the Apoſtolate,” from the ſame painter, all of folio dimenſions.

George Foſſato was born A. D. 1710, and was probably of the ſame family with the preceding artiſt. We are ignorant of whom he was the pupil; but he worked ſome time at Milan, and from thence went to Venice, where he ſettled.

He etched the edifices which the celebrated architect Palladio erected at Padua, Vicenza, and other towns and cities of Italy, which was publiſhed by Paſinelli at Venice, during the years 1740 and 1745, in French and Italian, of large folio ſize. The etchings are well executed, and do honour to the taſte and intelligence of our artiſt.

Jacques Leonardis was born at Parma A. D. 1712. He learned the rudiments of art of M. Benville, (a portrait painter,) and J. B. Tiepolo. He engraved from the moſt celebrated pictures in Venice, and, with commendable regard to the public deficiencies, commonly made choice of thoſe which had not already been engraved; though he generally ſucceeded ſo well in copying the characters and effects of his originals, that he need not to have been either afraid or aſhamed of following other engravers, by working after the ſame pictures. The beſt of his productions are, “ Cupids playing,” after Julio Carpioni; “ The Rejoicing of Silenus,” from the ſame painter; “ Neptune in a Car drawn by Tritons,” from Seb. Conca; “ The Rape of Europa,” from the ſame maſter; two ruſtic ſubjects, one repreſenting “ A Village Fair;” and the other “ A Crowd of Beggars at the Gate of a Town,” from J. M. Creſpi; two comic ſubjects repreſenting “ The Diverſions of the Carnival at Venice,” from Tiepolo; “ The Golden Calf,” from Tintoret; and “ The Laſt Judgment,” from the ſame maſter, all of large folio ſize.

Michael Sorello was born in Spain, but in what year is uncertain. He ſettled at Rome A.D. 1750, and ſtudied engraving under Giacomo Frey, (for an account of whom ſee GERMAN *School of Engraving*,) and worked very much in the ſtyle of that very diſtinguiſhed maſter. The moſt conſiderable work we have by Sorello is a ſet of eight prints, engraved from the tapeſtry of the Vatican, after Raphael; he likewiſe engraved, after other Italian maſters, ſeveral meritorious plates for the Muſeum Florentinum. From the maſs of his works, the collector may, with advantage, ſelect good impreſſions of the following, for his Italian portfolio:—“ The Nativity,” where a ſhepherd, accompanied by his dog, is among the principal figures, from Coroï; “ The Purification of the Virgin;” and “ St. Peter proclaimed Chief of the Church,” from Carlo Maratti, all in large folio; and “ The Deſcent of Chriſt into Hell,” in ſmall folio; “ The Reſurrection,” dedicated to Antonio Colona; “ The Diſciples at Emaus,” in large folio; “ Chriſt repreſented as a Gardener,” or, the “ Noli me Tangere;” “ The Converſion of St. Paul,” from C. Maratti; the frontiſpiece for the Monologium Græcorum, after Seb. Conca; and an “Annunciation of the bleſſed Virgin,” from Feliſe de Caſtro, (a Spaniſh painter,) both in large folio.

Paul Pilaja, or Pilaia, was a native of Italy, and appears to have been born about the year 1718. The circumſtances of his life have not been recorded, but he ſeems to have worked at Rome. He engraved the prints for a book entitled “ Storia di Volſena,” by the Abbé Adami, with the portrait of the author, after the Cavalier Odam; which book, according to Gandellini, was printed at Rome in the year 1737. He alſo engraved, in folio, the ſtatue of the prophet Elias, from Aug. Cornachini, erected at St. Peter's cathedral; the portrait of pope Benedict XIII. from J. B. Brughi, a Roman painter; “ The Martyrdom of the Capuchin St. Fedele da Simaringa,” from Seb. Conca, both of folio ſize; “ The Miracle performed by St. Thoribio, archbiſhop of Lima, while preaching to the

Indians," in large folio; "Liberality" with two children, in folio; and "Clodius, diſguiſed as a Woman, diſcovered at the Houſe of Cæſar," both from the ſame maſter, in large folio.

Niccolo and Antonio Billi were brothers, and born at Rome ſome time about the year 1719, or 1720. Of the family of this name, which were long known at Rome, as printſellers, and ſome of whom were engravers alſo, we ſhall mention only theſe brothers, who engraved many portraits and devotional ſubjects at Rome, and various plates for the volumes of the antiquities of Herculaneum, at Naples, executed in a ſtiff ſtyle, without much taſte. Niccolo engraved many of the plates for the Muſeum Florentinum, and among his productions are alſo the portraits of Fredericus Zuccharus, drawn by Campiglia; John Holbein, "ſe ipſe pinxit." Pietro Leonardo Ghezzi; John Maria Morandi; the cardinal Pompeo Aldrovandini, all in folio; the cardinal Joſeph Spinelli Dom. Dupræ pinx.; "The Infant Jeſus," in an oval, of 4to. ſize, from J. Conca; "St. Philip of Neri, kneeling before the Virgin," from S. Conca; "A Holy Family," half figures, from Caracci, in 4to; and "The Flight into Egypt," from Guido, in large folio.

Carlo Gregorio, or Gregori, was born at Florence in 1719, and died in the ſame city A.D. 1759. He learned engraving at Rome under the direction of Giacomo Frey, and worked for the greateſt part of his life in his birthplace, after the celebrated painters of Florence. Part of the plates from the cabinet of the marquis Gerini, and ſome of thoſe in the Muſeo Fiorentino, are by him, of which collections they conſtitute the beſt and greateſt part. Among his productions the following may alſo be mentioned with approbation, *viz.* the portraits of Franciſco Maria, grand duke of Tuſcany, from Campiglia; his ducheſs, Eleonora Vincentina of Gonzague, from the ſame painter; and Sebaſtian Bombelli, painted by himſelf, all in folio; the ſtatue of the Virgin, brought to Bologna by angels, from a deſign by dal Fratta; St. Catherine Jannen, from F. Bartolozzi, all of folio ſize; "L'Iſtoria di Ceſare, a cui nell Egitto molte Nazoni preſentarono vari donativi—Soldano d'Egitto," from Alexander Allovi, detto il Cruppino; "Opus Bernardini Barbatello, detto Poccetti, quod in facello S. S. Nerei & Achillei in Atrio Templi S. Magdalenæ de Pazzis Florentia adſervatur;" fourteen ſubjects from the Lives of the Saints, at the church of St. Magdalen at Florence; theſe were engraved in conjunction with his ſon Ferdinand, in large folio; "The Virgin and other holy Women at the Sepulchre," from a picture by Raphael, in the cabinet of lord Scarſdale, in folio; St. Padio, a biſhop of Florence, from Sig. Betti, in 4to; St. Bonizella Cacciaconti, a half figure, from Ant. Bonfigli, in 4to.; and the mauſoleum of the princeſs Elizabeth Charlotte of Lorraine, from Joſ. Chamant, in folio.

Ferdinand Gregori was the ſon of Carlo, and born in the ſame city A.D. 1740. He learned the principles of drawing and engraving in his father's houſe, after whoſe death he travelled with Vincent Vangeliſti to Paris, to finiſh his ſtudies under Wille. He afterwards returned to his native country, and publiſhed ſeveral meritorious works, among which were a print of "The Death of St. Louis Gonzaga," after a deſign by J. B. Cipriani; and a portrait of Carlo Gregori, drawn and engraved by Ferdinand; "The Virgin ſuckling the Infant Jeſus," from Carlo Maratti, in folio; "A ſleeping Venus," from Guido, in large folio; "St. Sebaſtian faſtened to a Tree," a half figure, from the ſame painter; "Venus diſcovering Cupid mounted on a Dolphin," from J. Caſanova, both in folio; two marble groups from Cellini, a Florentine ſculptor, after the deſigns of Allegranti, in large folio; "A Holy Family," from a painting in freſco, by Andrea del Sarto, in ſmall folio, with a very good effect; and "St. Stephen ſtoned," from Louis Cardi, (whoſe picture has a grand character, which is very well preſerved in the engraving,) of folio ſize.

Antonio Joſeph Barbazza, was born at Rome A.D. 1720. The life and works of this artiſt are very obſcure, and we can only ſpecify, that he was a member of the Bologneſe Academy, and travelled to Spain in 1771. His pictures are leſs numerous than either his drawings or engravings, which are much eſteemed by connoiſſeurs. Among his prints, four large heads from nature, in the ſtyle of pen and ink drawings, are juſtly intitled to high praiſe for their truth and originality; a group of muſicians, among whom is a caricature of M. Perez, of muſical celebrity, in 4to.; the plates for the book of father Bianchini, intitled "Iſtorica Eccleſiaſtica," in 4to.; and ſome plates for the work of Monaldini, who publiſhed new editions of Virgil, and other of the claſſic authors of antiquity.

Jean Elias Morghen was a native of Germany. He was born in the year 1712, travelled to Italy in his youth, and remained there during the greater part of his life, reſiding for the moſt part at Florence. He made all the drawings, and engraved moſt of the plates, for the work which was executed under the patronage of the marquis Gerini, after the pictures of Franceſchini and other celebrated maſters, which decorate the ducal palace of Tuſcany. He alſo engraved and publiſhed, in 1767, "The Antiquities of Pæſtum," on ſix plates, after drawings by Antonio Joleg.

Philip Morghen was the ſon and pupil of Jean Elias, and was born in Italy, probably at Florence, in the year 1740. He went, either for profeſſional improvement or employ, to Naples, where he executed a great number of the plates for the antiquities of Herculaneum, including the portrait of the king of Naples, which ſerves as a frontiſpiece to the work.

Philip alſo engraved a ſet of twelve folio plates of ſtatues at Florence, called the Apoſtles of Bandinelli, and thirty-one views of ruined edifices in and about the city of Naples.

His ſon, or his nephew Raphael Morghen, who has ſignalized himſelf by the production of Da Vinci's Laſt Supper, and other meritorious works, and who ſtill lives and engraves at Florence, will become the worthy theme of future hiſtorians of the Italian ſchool of engraving.

Franceſco Londonio (whoſe name and merits appear to have been unaccountably overlooked by our countryman Strutt) was born at Milan A. D. 1723. He began his career in art with the ſtudy of hiſtorical painting, but ſoon abandoned the heroiſm and duplicity of man, for the honeſty of the brute creation, and particularly attached himſelf to the painting and etching of domeſticated animals, in both of which arts he was eminently ſucceſsful.

In the year 1769 he travelled to Rome, Genoa, Naples, and other parts of Italy, and during his ſtay in the latter city, he made occaſional journies to the ſurrounding villages, and ſtudied nature with great attention, particularly thoſe ruſtic and unſophiſticated actions and ſcenes, which were congenial with the ſimplicity of his own habits and feelings. Here he paſſed the greater part of his time in etching and engraving, and here, as is believed, he died of an apoplexy in the year 1783.

Londonio engraved a great number of rural and paſtoral ſubjects, conſiſting for the moſt part of peaſantry and cattle, with the accompaniments of pictureſque banks, trees, and water, in a ſtyle which, though original, and evidently the offspring of his own obſervation and feeling, bears ſtrong reſemblance to the beſt etchings of Berghem and Viſſcher;

uſing the graver and dry-point, with great propriety, only as occaſional auxiliaries to his etching-needle.

The works of this artiſt compoſe ſeven ſets, conſiſting in the whole of ſeventy-two plates, of which the ſubjects are the rural occupations of Italian peaſantry, &c. One of theſe ſets is dedicated to cardinal Pozobonelli; another to the earl of Exeter, and the reſt to different noblemen and gentlemen who had befriended their author, who were moſt of them Engliſhmen. Londonio ſometimes printed his plates on blue paper, and heightened his lights with white chalk, by which means he produced an agreeable effect.

A picture by this artiſt, of a Milaneſe peaſant at the entrance of a hut, with goats, is now in the collection of the moſt noble the marquis of Stafford, at Cleveland houſe. His pictures are rare, and this is probably the only one in England: it has no very powerful chiaroſcuro, but is painted with exquiſite feeling, and great dexterity of pencil.

Gioſeffo Camerata was born at Venice A. D. 1724. He ſtudied engraving under John Cattini, and travelled to Vienna in 1742, where he learned miniature painting, which he ever after occaſionally practiſed. In the year 1751, he was invited to Dreſden, to engrave for the great work from the Electoral gallery in that metropolis, but the war breaking out he returned to Italy. When peace was proclaimed, he once more travelled to Saxony with the electoral prince; ſoon after which he was elected one of the profeſſors to the Dreſden academy.

This laborious artiſt engraved a great number of plates, many of which were from his own deſigns; among them are the portraits of Marco Foſcarini, procurator of St. Mark, and doge of Venice; Simon Cantarini, another procurator of St. Mark, both of folio ſize; Sebaſtien Bombelli, in quarto; a whole length of Thereſa Zamelli, a celebrated dancer, dreſſed in the Turkiſh ſtyle; and a large head of Mademoiſelle Abuzzi, in folio.

For the *Dreſden Gallery*, Camerata engraved two parables from the New Teſtament, after Feti; "David with the Head and Sword of Goliah," in folio; "A Holy Family," after Julius Cæſar Procaccini; "St. Roche relieving the People afflicted with the Plague," after Camillio Procaccini; "The Charity of St. Roche," after Caracci; "The Aſſumption of the Virgin," from the ſame painter, all of large folio ſize; "The Woman taken in Adultery," after Biſcaino, in folio; "The Chaſtity of Joſeph," from S. Cantarini, in folio; and the Old and New Teſtaments, after And. Vaccari, in large folio. Of his works of ſubſequent date, the following are to be preferred:—"A Holy Family," after Procaccini, in folio; "The Penitent Magdalen," from a picture by P. Battoni, in the Dreſden gallery, in large folio; "A ſleeping Shepherd," from J. M. Creſpi; "St. George refuſing to ſacriſice to the Idol," from Count Rotari, both in large folio. Two half length figures with long beards, after Dietrich; and a Magdalen, in miniature; from Vander Werff, of the ſame ſize as the original. This was Camerata's laſt engraving.

Joſeph Canale was born at Rome in the year 1728, and became a profeſſor of the academy at Dreſden, and honorary member of that of Bologna. He ſtudied engraving under the direction of that juſtly celebrated maſter Giacomo Frey, and alſo frequented the ſchool of Cavalier Beneſiali. At Dreſden much of his time was taken up in making the drawings from the pictures which were to be engraven both by himſelf and others, for the publication of "The Dreſden Gallery."

Canale had many pupils who did him honour; and his engravings are very numerous. Among them the following are ſome of thoſe which are held in moſt eſteem.

Portraits.—Maria-Mattia Perini, a half figure from Marco Beneſiali, in quarto; Maria-Antonia Walburgis, electoreſs dowager of Saxony, from a painting by herſelf in crayons; the archbiſhop Bonaventura Barberini; Maria Joſephini, queen of Poland, after Rotari; the profile of the prince Xavier, after Caſanova, all in folio; and the ſepulchral monument of cardinal Spinola at Rome, in large folio.

Hiſtorical Subjects.—"Imagina miraculoſa della S. Virgine Maria tranſportata nella Baſilica Lateranenſe," in ſmall folio; "The good Engliſhman," after Signora Roſalba, from the Crayon cabinet at Dreſden, the ſame ſize; "The Philoſopher," after Eſpagnolet; "Glory," after Dominichino; "A Sybil," after Angelica Kauffman; "Paris on mount Ida," after Vanloo; "Adam and Eve diſmiſſed from Paradiſe," after Albanus; "Chriſt and St. John," after Vander Werff; "Chriſt appearing to St. Thomas," after Mat. Preti, for the collection from the Dreſden gallery. (This plate was only etched by Camerata and finiſhed by Jean Beauvarlet.) "A Turkiſh Woman," half length, from Dietrich; and "Spring," a half figure, from the ſame maſter, of which the laſt three plates are of folio dimenſions.

Bartolomeo Crivellari was born at Venice A. D. 1725. He became the diſciple of Wagner, and worked under his direction, from the pictures of Gherardini, Tiarini, Tiepolo, and others, and he likewiſe engraved ſome plates for the Inſtitution at Bologna, but attained no very high degree of eminence in his art. Among other engravings by this artiſt are the following: Portraits of Chriſtian, prince royal, and elector of Saxony; and Mary-Ann, archducheſs of Auſtria, both of folio ſize. Three ſubjects from the life of St. Peter of Petronius. Four from Nicolo del Abatte, in folio: *viz.* 1. A Company of Card Players. 2 A Group of Drinkers, diverting themſelves, both half figures. 3. A Company of Muſicians. 4. Another Group of Muſicians, with a young Female playing the Harpſicord. "The Canonization of St. Alexander Saul," after Matteo Bartoloni; "A young Man and Female ſeated on a Couch," from Julio Romano, in ſmall folio, from the gallery of the king of Pruſſia.

Gaetano Gandolfi was a native of Bologna, and the contemporary and fellow ſtudent of Crevellari. He engraved, after Nicolo del Abatte, "The Nativity," with "The Adoration of the Shepherds," inſcribed "Opus hoc inciſumque expoſuit," &c. from a picture in freſco, at the palace Leoni at Bologna, in large folio, which latter engraving poſſeſſes ſo much merit as to make us regret that he engraved ſo little, and that we do not know more of this artiſt.

Giovanni-Baptiſta Broſtoloni or Bruſtoloni, was born at Venice in the year 1726. He always reſided in the place of his birth, and was probably a pupil of Joſeph Wagner. We are only able to ſpecify the following engravings by him. The portrait of pope Benoit XIV. in an oval, a vignette with the ſame portrait; "St. Thereſa in Rapture," in folio. A ſet of twenty views of Venice, etched after Ant. Canale, in folio. Another curious ſet of twelve large plates, from the ſame maſter, repreſent the ceremonies made uſe of at the election of the doge of Venice, and at his allegorical marriage with the ſea.

Benigne Boſſi was born, according to Baſan, at Porto d'Arciſato, in the Milaneſe territory, A.D. 1727. At the age of ten, his father took him to Nuremberg, where he learned the elements of deſign; and from thence, on the death of his father, he travelled to Rome, and ſtudied under Pompeus Battoni, Hutin, Dietrich, and Mengs. The latter adviſed him to practiſe etching, which he did till his death. The ſeven years' war, of which Saxony was almoſt the continual ſeat, obliged Boſſi to return to Italy, and in 1760 he was received at the court of the duke of Parma, where he lived honorably, occupied with letters and the arts. The following are among the beſt of his works. A portrait of the engraver Boetius of Dreſden; "The Preſentation in the Temple," (publiſhed at Dreſden); a ſet of heads and other ſubjects on forty ſmall plates, etched with taſte and in a very ſpirited ſtyle; a ſet of vaſes, and a maſquerade, after Petitot; four ſubjects of trophies; the Attributes of the Four Seaſons, incloſed in circular wreaths; two ſubjects of children, in ſmall folio; a ſet of twenty-nine etched, and waſhed in with water colours to imitate the original drawings by Parmegiano; the cities of Piedmont; allegorical figures for an Epithalamium; and the celebrated St. Catherine, who was related to the houſe of Sanritali, engraved the ſize of the picture, and a very capital print.

Antonio Baratti was born at Florence in the year 1727. He worked for the collection of prints after the beſt pictures in the cabinet of the marquis Gerini, of which Mariette has given a deſcription, and of which the firſt volume was publiſhed in large folio, A. D. 1759, at Florence. He likewiſe engraved after various Italian maſters, and among others the portrait of Jean Bettini Cignarolli, after Della Roſa; of 4to. ſize.

Pietro Campana was born at Soria A. D. 1727. He learned engraving of Rocho Pozzi, and worked moſt part of his life at Rome and Naples. We find ſeveral of his engravings in the cabinets of Florence and Herculaneum; among which the following are moſt worthy of dſtinction: "St. Francis of Paul," a half figure; "Charity," in a ſmall oval; "St. Peter delivered from Priſon by an Angel," after Matt. Preti, from the Dreſden gallery, in folio; the portrait of Pietro Berretini da Cortona, from the Florentine cabinet; and Bernardino Barbatelli, detto B. Poccetti pittore Ferretti, both in folio.

Carlo Orſolini was born A. D. 1724, in the city of Venice, where he generally reſided, and where he carried on a conſiderable commerce in prints. He engraved for the Florentine Gallery, and among the beſt of his prints are "St. Jerome meditating," inſcribed "poſt multas lachrymas," &c. from Ant. Baleſtra, a much admired plate, in large folio. Four others from legendary ſtories of the ſaints Aloyſius, Staniſlaus, Francis, and Bernard, and the High-prieſt, all of folio dimenſions.

Bernardino Belotti, ſurnamed Il Canaletto, was alſo born at Venice in the year 1724, and died at Varſovie in 1780. He was called Canaletto from his very diſtinguiſhed uncle Antonio Canaletti, by whom he was inſtructed, and whoſe ſtyle he ſucceſsfully imitated. After viſiting Rome and other cities of Italy, he travelled to Germany, where he obtained the title of count Belotti, and made ſome ſtay at the courts of Vienna and Dreſden.

The ſubjects of his prints, which conſiſted for the moſt part of etching, are landſcapes, generally views, (or portraits of celebrated places,) which he treated in a pictureſque taſte, and which have been held in deſerved eſteem.

The moſt remarkable of theſe are, a ſet of ſix views of Vienna, &c. in folio; two other ſets, each conſiſting of ſix architectural ruins in quarto; and a very large plate, entitled "The generous Turk," the whole of which were executed during his ſtay at Vienna.

Thoſe which he engraved at Dreſden are larger and more numerous. Among theſe we ſhall diſtinguiſh views of the port Wilſdruffer Thor, with the ramparts, theatre, and public library; the gallery of Zwinger, with the bridge at the entry of Oſtra; interior of the Zwinger, with the pavilions and galleries; the Catholic church with part of the electoral palace; the bridge over the Elbe, with a profile of the Catholic church; the gallery and gardens of count Bruhl; the church of the holy Virgin, &c.; the picture gallery at the above church, &c.; the ſquare before the grand guard-houſe; the old market at the ſide of the church of St. Croſs; the church and ſtreet of St. Croſs; the ruins of the belfry of the church of St. Croſs, which fell on the 22d of June 1763, at the bombardment of Dreſden; the ruins of a part of the ſuburbs of that city, before the port of Pirna; and two views of the new town and palace of Holland, with the equeſtrian ſtatue of Auguſtus II.

Views in the Neighbourhood of Dreſden.—The town of Pirna, on the ſide of the gate called Oberthor; the ſuburbs of the town of Pirna, before the waterman's gate; Pirna before the gate of Dohna; the façade of the caſtle of Sonnenſtein on the banks of the Elbe, in the back-ground the city of Pirna; the ramparts of Sonnenſtein, with the priſons, &c.; the fortreſs of Sonnenſtein, from the road to Kœnigſtein; the rock and fortreſs of Kœnigſtein on the ſouth ſide; the rock and fortreſs of the ſame city on the weſtern ſide, with the caſtle of Lilienſtein in view.

Views in Warſaw.—The abode of the Bernardin monks, as it preſents itſelf from the gate of Cracow; Warſaw, from the palace of Sapieha, to the end of Szolle, and from thence to the caſtle of Villanova, with part of the town of Prague; the city of Warſaw, from the palace of the Ordinate to the royal caſtle.

Dominico Cunego was born at Verona in the year 1727. He learned the principles of drawing and painting in the ſchool of Franceſco Ferrari, but feeling a ſtrong deſire to become an engraver, he copied, without any previous inſtruction, various prints by the moſt celebrated engravers. His earlieſt engravings, (after theſe preparatory ſtudies,) were the medals for the book of the marquis Giacomo Muſeli Veroneſe.

He afterwards went to Rome with Mr. Adams, the Engliſh architect, where he engraved certain Roman antiquities, and, we believe, ſome of the ruins of Diocleſian's palace at Spalatro, after Cleriſſeau; beſides many other plates from celebrated Italian paintings; and moſt of the prints for the Schola Italica of Gavin Hamilton. Strutt ſuppoſes that he viſited England, but this is perhaps a miſtake into which he may have been led by the circumſtance of Cunego's having engraved for Boydell's collection, and for the Meſſrs. Adams. When he was about ſixty years of age, he was invited to Berlin, to work perhaps as preceptor, in an academy of engraving, eſtabliſhed by an individual named Paſcal; where he engraved a great number of portraits both in the line manner, and in aquatinta, after Cuningham; but this eſtabliſhment not ſucceeding, he returned to Rome in 1789; in which metropolis, as is believed, he died within theſe few years. In the following liſt will be found mentioned all his works that are of any importance.

Portraits engraven after Cuningham.—Frederick II. king of Pruſſia, a whole-length figure, with the two favourite leverets of the king, in aquatinta; another portrait of king Frederick; two portraits of Frederick William, prince royal of Pruſſia; Frederica Charlotte, princeſs of Pruſſia, repreſented walking in a garden; and Frederick-Louis-Charles, Frederick-William, and the princeſs Frederica, whole-length figures, all of large folio ſize.

Subjects for the Schola Italica of Hamilton.—"The Creation of the Waters," in ſmall folio; "The Creation of the Sun and Moon," in large folio; and "The Creation of Adam," in folio, all from Michael Angelo, in the Siſtine Chapel; "Fornarina, the Miſtreſs of Raphael," after a picture by that maſter, at the palace Barberini, ſmall folio ſize; "Galatea on the Water," from Raphael, in the Farneſe Palace, in large folio; "The Daughter of Robert Strozzi, a Florentine Nobleman," from Titian, in folio; "The Rape of Ganymede," after Titian, in ſmall folio; a head, with a long beard, after Baſſan; a buſt of St. Jerome; St. Hieronymus, from Guido; buſt of an old man after the ſame painter; a fine head of a Mary Magdalen, after the ſame, in ſmall folio; a half-length portrait of an old man, after Guercino; "The Infant Prodigy," after a picture by the ſame maſter, in the palace Lancellotti, at Rome, all of folio ſize; "The Birth of St. John the Baptiſt;" and "Providence," ſurrounded by children, both of large folio ſize, after L. Caracci; "Galatea on the Sea," after a picture by Auguſtino Caracci, in the Farneſe Gallery; "Apollo and Silenus," from Annib. Caracci; "A Penitent Magdalen lying on Thorns," after the ſame; "A young Man and Woman in Converſation," after Giorgione; "Apollo ſupporting the wounded Hyacinthus," after Dominichino, at Rome; "The Death of St. Cecilia," from the ſame maſter; and "Two Nereids, accompanied by three Cupids," from Albano, all of large folio dimenſions.

Subjects after various Maſters.—Benedictus Joſephus Labre, Bolonienſis, And. Bleg. pinx. in large folio; Clement XIV. (Ganganelli) Gio. Dom. Campiglia pinx. in folio; Frederick Chriſtian, prince royal of Poland, and elector of Saxony, drawn and engraved by Cunego, at Verona, alſo in folio; Eques Antonius Raphael Mengs, ſe ipſum pinx.; "The Virgin with the Holy Infant in her Arms," A. R. Mengs pinx. both in quarto; five large plates, from the pictures of Raphael Mengs in the library of the Vatican; "St. Baſil celebrating the Greek Maſs," after P. Subleyras; one of the altar-pieces of St. Peter's at Rome, executed in Moſaic, large folio ſize; "Juno with the Ceſtus of Venus;" and "Hebe preſenting the Cup to Jupiter," (companions) of folio ſize, both after Gavin Hamilton; the l'Allegro and Il Penſeroſo of Milton, folio ſize; "Innocence, with a Lamb," a very intereſting print, with much of truth, ſincerity, and ſimplicity of character and expreſſion, and which does honour both to the painter and engraver; "Briſeis taken from the Tent of Achilles, who is regretting her Loſs;" "Achilles mourning over the dead Body of Patroclus;" "Achilles dragging the dead Body of Hector at his Chariot Wheels;" "Achilles delivering the Body of Hector to Priam;" "Andromache mourning the Death of Hector," all of large folio ſize, from Gavin Hamilton; "Brutus ſwearing to revenge the Death of Lucretia," in folio, from the ſame painter; a half length of "The Virgin and Child," from J. B. Cignaroles; the ſame ſubject from Coreggio; "A Magdalen," from the ſame painter; "The Apoſtle St. Andrew," after Guido Cagnaci; "St. Thomas of Villanova," from Ant. Cavazoni; "A Philoſopher with a long Beard," from Cellani; "The Sick healed," after L. Caracci, all of folio dimenſions; "Chriſt bearing the Croſs," a very grand compoſition, after Raphael, in large folio; and "Chriſt laid in the Tomb," a very large upright plate, after Eſpagnoletto; "The Godhead in the Heavens, attended by Angels," from Dominichino, in folio; "The Annunciation," from the ſame painter, in large folio, from the chapel of Nolfi; "The Viſitation;" "The Nativity;" "The Circumciſion," all in large folio ſize; "The Adoration of the Kings;" "The Preſentation in the Temple;" "The Flight into Egypt," of folio ſize, in a circle; "A dead Chriſt, with the two Maries and Angels," in large folio; and a very large upright plate of "The Virgin in a Radiance of Glory, ſurrounded by Angels, and crowned by the Holy Trinity," all from Dominichino; "Rinaldo aſleep on the Car of Armida, which is drawn by winged Dragons;" "Guerchino da Cento pinx. Romæ in Ædibus Coſtaguti, Dom. Cunego ſculpſit," of very large folio ſize; "Time diſcovering Truth," a fine compoſition, executed at Rome in the palace of the marquis Coſtaguti, in ſix large plates independent of the general plan of the ceiling; "The Laſt Judgment," from the Siſtine Chapel of the Vatican, after Michael Angelo, a very large plate; the corners of the ſame chapel from the ſame painter; an antique tomb, on which is repreſented a bacchanalian bas-relief, found in the Villa of Caſali, in 1767, in folio; and thirteen views of antique edifices and celebrated ruins in Italy, after Cleriſſeau, on large plates, engraved with boldneſs, but very inferior, in taſte and ſtyle, to the beſt repreſentations of ſuch ſubjects, by Piraneſi and Rooker.

Giovanni Battiſta Cipriani ſhould not be left unmentioned among the Italian engravers of this period. Of his biography we have already treated. (See CIPRIANI.) He etched ſeveral plates with conſiderable ſpirit, and a ſimplicity of ſtyle in his handling, which borders on dryneſs, of which ſome are from his own compoſition, and ſome from thoſe of other maſters.

Among theſe are ſeveral portraits of diſtinguiſhed characters, who lived in the time of Cromwell, of which four heads of Milton, which being taken at different periods of his life, from infancy to age, form an intereſting phyſiognomical ſeries, are particularly worthy of notice. They are rare, and intrinſically valuable prints, of 4to. or rather ſmall folio ſize, in ovals, and are done from originals which were in the poſſeſſion of T. B. Hollis, eſq. and which, therefore, have every claim to authenticity.

He alſo etched, "The Deſcent from the Croſs," after Vandyke; "The Death of Cleopatra," after Benvenuto Cellini; and "The Deſcent of the Holy Ghoſt," after Gabbiani; and, from his own deſign, "The Mother and Child," in folio, and ſome others.

Gioſeffo Zucchi was born at Venice A.D. 1730, where he worked for ſome time in conjunction with Amiconi and Wagner, engraving for the ſame ſets of rural and hiſtorical prints, in which appear the names of Wagner and Bartolozzi. He afterwards went to Florence, where he painted the ornaments of the principal pleaſure houſes and villas in that city and its neighbourhood, from which prints were engraved. Of theſe he himſelf engraved two, and in many of the other plates he etched the figures. He alſo engraved after different maſters and from his own compoſitions, many other ſubjects, among which are the following:—A half figure of a man, with a furred hat on, in 4to.; rural converſation; "The Paſſage through the Red Sea," in large folio, ſuppoſed to be after Bourguignon; "The Virgin and Child crowned by Angels," after Guido, in 4to.; "Joſeph ſold by his Brethren;" "The Rape of Europa," after Peſareſe; "The Maſk of Vice taken from Hiſtory," after Balt. Franceſchini; "Virtue ſeizing Love by the Wings," from the ſame maſter, all of quarto ſize; "Offerings to Ceres," after P. Cortona, in folio; "The Choice of Hercules," after the ſame painter, in folio; "The Three Graces," one of whom plays the lyre, while the other two are ſinging, after P. Cortona, of quarto ſize; and "Eneas deſcending to Hades," after Solimene, in ſmall folio.

Gioſeffo Zucchi, the younger, was born in the ſame city A.D. 1732, and was probably related to the fore-mentioned artiſt. He came to London in queſt of profeſſional employment as an engraver; and here he became acquainted with Angelica Kauſſman, with whom he travelled to Rome, and afterwards married. The engravings that we know of, by this artiſt, were all executed at London, from which it appears, that after he had once ingratiated himſelf into the good graces of Angelica, he engraved no more.

The ſubjects of Zucchi's prints are as follow:—"The Muſe Erato," after Angelica Kauffman, in folio; "The Muſe Urania;" "The Symbol of Simplicity;" "Calypſo invoking Heaven and Earth to witneſs her Affection for Ulyſſes," in large folio, from Ang. Kauffman; "The Judgment of Hercules," from P. Cortona; "An Offering to Ceres," both in large folio; "Eneas and Dido taking refuge in the Grotto," after Guido; "The Virgin with the Holy Infant in the Clouds, ſurrounded by Angels," from the ſame maſter, in folio; "The Virgin and Child with St. John, between two Saints," Bartolomeo pinx.; "The Denial of St. Peter," from Guercino; "Jupiter and Europa accompanied by Nymphs;" and "Jupiter and Europa on the Waves of the Ocean, accompanied by Cupids," all of folio dimenſions.

Giovanni (or John) Volpato, was born at Baſſano, in the Venetian territory, in the year 1738, and in his early youth practiſed embroidery, which he learned of his mother, but afterwards applied himſelf to the ſtudy of engraving, which he followed for ſome time without any maſter, urged by the force of his own inclination, or attracted by ſuch beauties of the art, as he ſaw in the printſhops of Baſſano.

He made a journey to Venice for the ſake of obtaining information on what had now become the ſettled ſubject of his ſtudies. Here, for ſome reaſon that has not tranſpired, perhaps from youthful affectation, perhaps from diffidence, he publiſhed his firſt plates under the aſſumed name of John Renard, and here he was firſt made known to the celebrated and benevolent Bartolozzi, who intereſted himſelf in the welfare of the young artiſt, and imparted to him the information of which he came in queſt.

Volpato now felt more confidence; no longer withheld his name from the public, and ſoon produced engravings after Amiconi and Piazetta, which obtained him approbation and encouragement, and were followed by others after Maiotto, Zuccarelli, and Marco Ricci.

From Venice our engraver travelled to Rome, where his abilities ſoon eſtabliſhed him as a reputable engraver, and where his largeſt and beſt works were performed. A ſociety of amateurs, very fortunately for him, had about this time conceived the project of patronizing the firſt engravers of the country, in the production of a ſet of large plates after Raphael's pictures in the Vatican; and among thoſe who were engaged, none diſtinguiſhed himſelf more by his induſtry, nor perhaps by his talents, than Volpato, who continued for many years to enrich the public with large plates, which have obtained him much praiſe from the critics and connoiſſeurs of the continent, and which are engraved after the very fineſt pictures that have been produced ſince the revival of art.

This was a noble race for an engraver to run, and his pupil and ſon-in-law Raphael Morghen is now following with ſuperior brilliancy in the ſame courſe.

The works of Volpato have been the ſubject of eulogium with Roſt, Huber, and ſome other of the German, French, and Italian writers upon art, but, in the eſtimation of the preſent writer, are deficient in richneſs and variety, and are more the reſult of mechanical care and patient induſtry, than of taſte and feeling. His lights eſpecially, when compared with thoſe of Gerard Audran, Giacomo Frey, ſir Robert Strange, or his countryman Schiavonetti, of whom we are about to ſpeak, are either papery, or cold and metallic. There is no playfulneſs of pencil; no evidence of a mind that glows and moves through its work with painter-like felicity, but the ſpectator is perpetually reminded of the rigid and undeviating courſe of the graving-tool; and though the chaſte forms and pathos of Raphael will always give a certain value to the works of Volpato, and even afford ſome argument in favour of the dryneſs of his ſtyle, poſterity will not place him in the very firſt rank of engravers.

Indeed, ſo dead was our artiſt to the more exquiſite ſuſceptibilities of his art, or ſo eager for the obtainment of profit, that (like thoſe in our own country who have converted Macbeth into a burletta) he joined with Du Cros, and his little ſchool of petty colourers, in a ſcheme for painting over with water colours, his ſmaller ſets of engravings from the gallery of Caracci at the Farneſe palace, and the Loggio and Stanzas of Raphael at the Vatican, beſides ſome ſets of prints on a larger ſcale, of views in Rome and its environs.

Now, in works of this kind, the addition of colour, eſpecially if ſome of the pigments employed be opaque, (as is the caſe in the coloured prints of Volpato,) inevitably deſtroys the beauty of the engraving, which in its turn mars that of the colours. It is, therefore, a mode of mutual deſtruction in art, which is juſtly regretted by thoſe who know, or who believe, that the art of engraving is capable of becoming, of itſelf and without extrinſic addition, an appropriate vehicle for rendering every perfection that painting has yet attained.

In England we are but emerging from the miſtakes into which coloured works of this kind, aided by the cupidity of dealers, had plunged the national taſte, and we therefore may at leaſt ſtand excuſed, if we dwell upon the misfortune to art that muſt enſue when a diſtinguiſhed profeſſor joins his efforts with thoſe of the miſtaken ſons of commerce, to break down the natural barriers between one art and another, and obliterate the delicate lines of demarcation which the finger of ſcience has traced upon the orb of the intellectual world.

"According to an ancient fable, which has an excellent moral, the bluſtering muſic of Pan did for a while ſeem ſucceſsfully to ſilence the chaſte harmony of Apollo; and as the ſenſes of the vulgar, we know, are powerfully aſſailed by red, blue, and yellow, however "idly ſpread," it may yet be ſome time before the multitude are ſufficiently informed, entirely to diſcard coloured engravings; but as even the tea-gardens have at length ſhut out coloured ſtatues, we cannot deſpair. Though the gaudy bubble may float awhile in the denſe atmoſphere with which faſhion has ſurrounded and chilled the ſphere of Britiſh engraving, it will ſooner or later burſt; and though ſome few, perhaps more than a few, ſhallow and inaccurate obſervers may for a time be pleaſed to their coſt, all mechanical modes of picture-making will eventually ſink into contempt, and painting and engraving will triumph as diſtinct and ſeparate arts.

"As we frequently hear the uninformed talk as if they conceived the higheſt effort of painting was merely to copy nature as nature appears to them, ſo it is very common to hear unreflecting people ſpeak of engraving, as if it were no other than an art of copying that of painting; which, though a great miſtake, is yet a very pardonable miſtake on the part of thoſe who have been led into it, when we conſider the ſtate in which the art of engraving has hitherto exiſted, and the difficulties, and the degradation, under which, in this country, it has hitherto laboured.

"Now engraving is no more an art of copying painting, than the Engliſh language is an art of copying Greek or Latin. Engraving is a diſtinct language of art; and though it may bear ſuch reſemblance to painting in the conſtruction of its grammar, as grammars of languages bear to each other, yet its alphabet and idiom, or mode of expreſſion, are totally different; if Engliſh be made the vehicle of the ſame thoughts which have previouſly been imparted to us by painting, it affords the means of affecting our minds in the ſame manner; this ſimilar affection of the mind has led to the miſtake, and little doubt may be entertained but that Engliſh would have been inconſiderately called an art of copying Greek, if we had never read any other Engliſh than tranſlations from the Greek.

“ The pretenſions of engraving, as of all the arts denominated fine, are ſimple, chaſte, unſophiſticated. Art ever diſdains artifice, attempts no impoſition, but honeſtly claims attention as being what it is. A ſtatue is to be looked at as being a ſtatue, not a real figure; a picture, not as a portion of actual nature; a print, not as a *copy* of painting.

“ Engravings, therefore, ſuch as thoſe of Volpato, are no more copies of Raphael's original pictures, than the ſame compoſitions, if ſculptured, or modelled in low relief, would be copies. In both caſes, they would be, not copies, but *tranſlations* from one language of art into another language of art.

“ But abſurdity bloſſoms luxuriantly, when engrafted on an original ſtock of error; and this vulgar and erroneous notion, that an engraving is a copy of a painting, has been aſſiduouſly cultivated by the avarice or ignorance of the dealers in prints, who always follow and pamper the taſte of the mob, be it ever ſo depraved, provided it be profitable. That graſs was green, and that ſoldiers' coats were red, was known to the moſt ignorant of the gaping multitude, and has given wings to credulity, and currency to empiriciſm. Neither is it of the ſmalleſt importance whether ignorance or the unprincipled love of gain have contributed moſt to the production of this effect, ſince the public taſte in either caſe has equally ſuffered. It is error ſufficient to call for animadverſion here, if the print-ſellers, (poſſeſſing, or poſſeſſed by, this miſtaken notion, and with the view of making the copy, in their own vulgar eſtimation, approach nearer to its original,) have cauſed colours to be literally and barbarouſly added to engraving: for to colour a legitimate engraving is not leſs palpably abſurd to an eye of taſteful diſcernment, than it would be to colour a diamond, which, as every one knows, would but obſcure the native brilliancy and beauty of the ſtone. And if a good engraving muſt thus ſuffer by being coloured, ſo neither can bad ones be thus converted to good pictures: at the utmoſt, nothing better than a ſort of mule production, (ſuch as thoſe by Volpato and Ducros, which have ſuggeſted the introduction of theſe remarks) can thus be generated, though with much more of the aſs than the horſe in its conſtitution.” Landſeer's Lectures.

Again, theſe obſervations acquire force in a compound ratio to the merits in point of colouring, of the pictures from which coloured plates may be engraven. For example, Fyt, Teniers, and Vandyke, are among the number of thoſe painters who are juſtly eſteemed inimitable for the beauty and harmony of their colours, and dextrous management of their pencils. If children could be brought, even in the way of copying, to pencil and colour like Fyt, Teniers, and Vandyke, thoſe maſters would loſe their high reputation, and this part of the painter's art would be in conſequence ſo depreciated, as to become of very little value. To pretend, therefore, to emulate the merits of a finely coloured and beautifully pencilled picture, ſo as to meet the eye, and merit a place in the cabinet, of a man of taſte,—and to do this on prints, by the ſcore or by the hundred,—is little leſs ridiculous than to talk of a machine for playing on the violin or organ, or of a mill for making verſes.

We ſhall notice the works of this popular engraver, nearly in the order in which they were produced.

While at Venice, and under the tuition of Bartolozzi, he engraved

Portraits of the doge Foſcarini, and the procurator Paſcal, of folio ſize, after Bartolozzi; a ſet of four from the Old Teſtament, in folio, from drawings by Bartolozzi, after the original pictures by Amiconi, of which the ſubjects are, 1. “ The Finding of Moſes;” 2. “ Laban ſearching for his Idols;” 3. “ The Servitude of Abraham,” and 4. “ Moſes erecting an Altar to the Lord.” Eight converſational ſubjects, in ſmall folio, after Maiotti; “ The Orgies, or Feaſt of Bacchus,” an hiſtorical landſcape, done for Wagner, after Zuccarelli; “ A Philoſopher proſtrate before an Altar, ſurrounded by Ruins,” from the ſame maſter, both in large folio; an Italian landſcape, with fiſhers; another landſcape, and peaſants; all from Zuccarelli; and two landſcapes after the elder Brand, all of large folio ſize.

Plates engraved at Rome.—“ The Four Sibyls of the Church of St. Mary of Peace,” after Raphael, in large folio; “ The Marriage of Alexander and Roxana,” from the ſame painter; “ Modeſty and Vanity,” after L. da Vinci, in ſquare folio; “ Perſeus delivering Andromeda,” from P. de Caravaggio; “ Our Saviour praying on the Mount of Olives,” from Coreggio, in large folio; “ Mary Magdalen waſhing the Feet of Our Saviour at the Table of Simon the Phariſee,” after P. Veroneſe; “ The Marriage of Cana,” after Tintoret, both of large folio ſize; and “ The Gameſters,” after M. A. de Caravaggio, in folio; all of which were for Hamilton's collection.

The Pictures of the Vatican, by Raphael, engraved in the line manner on a very large ſcale.—“ The School of Athens;” “ The Diſpute on the Holy Sacrament,” or “ Theology;” “ Heliodorus chaſed from the Temple of Jeruſalem;” “ The Progreſs of Attila arreſted at the Appearance of St. Peter and St. Paul;” “ St. Peter delivered from Priſon;” “ Mount Parnaſſus;” and “ The Burning of the City of Rome.” “ The Miracle of the Maſs of Bolſenna,” belonging to this ſet, is by Raphael Morghen, the ſon-in-law and pupil of Volpato.

Subjects from various Italian Painters, all very large.—“ The Deſcent from the Croſs,” from a painting by Raphael, in the Borgheſe palace; “ The Holy Virgin,” named “ La Saggiola of Florence,” from the ſame painter; “ The Holy Virgin of St. Mark,” after Fra. Bartolomeo; “ The Marriage of the Virgin,” from Guercino; “ Piety, or the Virgin of Pity;” and “ Aurora,” both from pictures by Guercino, in the Villa Ludoviſi; “ Day,” and “ Night,” which form a ſet with the Aurora, by the ſame painter; “ The Crucifixion,” from a picture by Guido, in the church of St. Lorenzo, in Lucina; “ The Venus” of Paolo Veroneſe, from the gallery of the Colonna palace; two ſubjects, with children, from Mola; a pair from the firſt navigator of Geſner, after F. Gianni; another pair, after the ſame painter, taken from Geſner's Idyllia; two landſcapes from Claude Lorraine, of which the originals were in the Colonna palace; a ſet of ſix, or rather three pairs, after Gavin Hamilton, of which the ſubjects are, 1. “ The Death of Lucretia;” 2. “ Innocence,” a plate of conſiderable merit and beauty; 3. “ Juno;” 4. “ Hebe;” 5. “ Il Penſeroſo;” 6. “ L'Allegro,” and the two prophets and two ſibyls, from Michael Angelo's pictures in the Siſtine Chapel.

The following are of ſmaller Dimenſions.—A ſet of thirty-ſix, in ſmall folio, from the antique ſtatues, with the dimenſions, &c. an elementary work for ſtudents in the arts; a ſet from the Farneſe gallery, conſiſting of three larger and three ſmaller plates, coloured; a ſet of eight views at Tivoli, coloured by Ducros and his aſſiſtants; another ſet of twenty views in Rome and its vicinity, coloured in the ſame manner, both folio books; another of fourteen ditto; another ſet of forty, from the Muſeum Clementinum; another ſet, printed on four large ſheets, from Raphael and Julio Romano.

It is much to the honour of modern Italy, that we have to cloſe our catalogue of its ſchool of engravers with the mention of two ſtars, than which no brighter have ſhone in the hemiſphere of the art.

Luigi, or Lewis Schiavonetti, was born at Baſſano, in the Venetian territory, in the year 1765. His father was a ſtationer, whoſe moderate circumſtances enabled him to give to his eight children, the eldeſt of whom was Lewis, a uſeful but limited education. From his infancy he had a taſte for drawing, and while his companions were at play, he was often ſeen kneeling on a ſtool in his father's ſhop, copying prints. By theſe, and ſuch other means as he poſſeſſed, he attained ſuch proficiency, that Julius Golini, (an able painter, to whom ſome of theſe early attempts were ſhewn,) undertook to inſtruct him in the art of drawing.

At the age of thirteen, Lewis was placed under his care, and the high opinion which he had formed of the boy's genius, was confirmed by the rapid progreſs he made, while his amiable diſpoſition endeared him ſo much, that Golini loved him as his own ſon. After three years, however, of uſeful inſtruction on the one part, and docile attention on the other, his tutor, unfortunately for our young artiſt, was attacked by a mortal diſeaſe. Lewis attended him during his illneſs with filial aſſiduity, received with becoming reverence his dying counſel and admonitions, and had the heart-piercing grief to ſee his maſter expire in his arms.

Being now left to purſue his own courſe, or aſſiſted only by ſuch advice as could be obtained in a town where Golini had been the only painter, he turned his views towards count Remaudini, who, though ennobled by this title, is proprietor (as it ſhould ſeem) of an extenſive typographical and chalcographical concern, and has inſcribed on marble how much he feels himſelf honoured by having publiſhed ſome of the works of Bartolozzi and Volpato.

The works of theſe diſtinguiſhed artiſts gave freſh impulſe to young Schiavonetti's ardour for improvement, and becoming acquainted about this time with one Lorio, an indifferent engraver, who was barely competent to teach the mechanical proceſs of the art, he applied to him for inſtruction. Unable to ſupport himſelf and family by his graver alone, Lorio officiated as ſacriſtan to a church, and could offer our artiſt no better accommodation for a ſtudy than the ſacriſty afforded, but which, his circumſtances not allowing him to apply elſewhere, he was obliged to accept.

Schiavonetti remained with this maſter about twelve months, when, finding he had exhauſted his fund of inſtruction, and feeling an averſion to ſtudying occaſionally among dead bodies, he reſolved to alter his ſituation. A copy which he had executed in the line manner, of a Holy Family, from Bartolozzi's print after Carlo Maratti, gained him employment from count Remaudini, and attracted the notice of another printſeller of Baſſano, of the name of Suntach; and between theſe rival printſellers it is probable that Schiavonetti might have long continued to exiſt on ſuch patronage as conſiſted with their views of profit, but for the kinder and more advantageous notice of ſome Venetian noblemen, and the occurrence of thoſe circumſtances which ended in his migration to England.

As theſe circumſtances have been detailed in print, in ſuch a manner as to ſtigmatiſe a certain naturalized ſubject of theſe realms with the reproach of having taken mean and ſelfiſh advantage of the yielding ſimplicity of Schiavonetti, and the credulity of Bartolozzi, with the view of converting to his own uſe and profit the abilities of the former, and the hoſpitality of the latter; and as the accuſed party has publicly required time for the collection of ſuch documents as might exculpate him from the charge, which documents he has not yet produced:—in ſuch a ſtate of evidence, it may be ſufficient to ſay of our engraver, that, after enduring ſome further difficulties and diſappointments, and after reſiding awhile under the roof, and receiving the inſtruction, of Mr. Bartolozzi, he, in concert with his brother Nicholas, commenced an independent eſtabliſhment.

From Bartolozzi's houſe at Northend, he removed to Sloane-ſquare, and from thence to Brompton, where he continued, to the hour of his death, to cultivate and improve the talent that Providence had beſtowed on him, uncheered by the ſunſhine of patronage:—or cheered, or chilled, by ſuch patronage only as conſiſted with the purblind views of commercial ſpeculators, and expoſed to the thouſand nameleſs wrongs,

> "That patient merit from th' unworthy takes."

Some time about the year 1792, he entered into a partnerſhip with certain printſellers, of which he had ſoon reaſon to repent; and the partnerſhip being diſſolved, and himſelf in poſſeſſion of ſome few engraved plates, he diſmiſſed a younger brother to the continent on a printſelling miſſion, which alſo ended in diſappointment: for, the wretched vacillation of Pruſſian politics, and the inroads of French ambition, ſoon ſwept away the younger Schiavonetti from Berlin, which had been fixed upon as the head-quarters of their commerce.

During the ſhort interval of peace between this country and France, he availed himſelf of the opportunity of viſiting Paris, with the twofold object in view,—of improving his natural talent, of which he never loſt ſight,—and, obtaining ſuch free acceſs to the gallery of the Louvre, which was then thrown open to the public, and ſuppoſed to contain the fineſt pictures in Europe, as might enable him to gratify himſelf with the pleaſure and advantage of ſelecting one or more ſubjects to engrave, ſuited to his own abilities. This is a gratification in which engravers of genius are but too rarely indulged. The difficulties and delicacies of ſolicitation, the demands of commerce, and the purblind ſtate of Engliſh patronage, (which, with all its benevolence, and all its power, has not yet emancipated itſelf from the miſtakes and the fetters of trade,) are bars which, in this country, none have been able to overleap: yet, nothing is more mentally obvious, than that other men can only judge of the talents of an engraver by what he *has done*, while the feelings of the engraver himſelf, if he has any, inform him, at the ſight of a gallery of fine pictures, what latent germs of genius or talent he may poſſeſs, adequate to the taſk of tranſlating ſuch of them as are painted with a ſpirit congenial to his own; what elements from the intellectual chaos of his untried powers may be called into exiſtence; how far, through his means, the boundaries of the art itſelf may be extended.

The ſhortneſs, however, of that lucid interval, marred, in ſome degree, the excellence of our artiſt's deſign, and compelled him to compromiſe with the madneſs of Europe, and his own untoward fortune. One of the ſubjects which he fixed upon was the Madre Doloroſa of Vandyke: but the return of war left him no alternative but to endeavour to ſatisfy himſelf as well as he could with a copy by another hand. The copy did not turn out very correct; yet, from this indifferent copy, aided by Bolſwert's print from the ſame original, and his own ſtrong recollections of Vandyke's picture, has Schiavonetti produced an engraving of very extraordinary merit, though on a much ſmaller ſcale than he had originally projected. What he intended to have engraven on an ample ſcale, for himſelf and the public at large, he was compelled by circumſtances, which legiſlators and patrons would do well to attend to, to engrave ſmall, and part with to the proprietors of the French national muſeum.

A very few years before his death, he formed an intention, which he communicated to his friends, of returning to Italy, or at leaſt of removing to a more ſoutherly climate; not that any ſerious apprehenſions were then entertained on the ſcore of his delicate health, but becauſe he felt the weight of taxes, and the want of encouragement: and, perhaps,—obſerving how well the quackeries of mountebank pretenſion ſucceeded in this metropolis, and feeling how ill merit in his profeſſion was rewarded,—he thought there was leſs of ſolid appreciation among us, than really exiſted. What delayed his departure, or altogether withheld him from going, the preſent writer can only conjecture; for he was ſhortly after diſappointed of engraving a large plate from Mr. Devis's picture of "The Death of Lord Nelſon,"—not becauſe the fifteen hundred guineas, which he required for the performance of the taſk was too much,—but becauſe the ſum which Mr. Bromley aſked was too little. Perhaps he lingered here, and only delayed his departure on account of the continental war, and conſequent difficulties of emigration; or, perhaps, he had reaſon latterly to entertain a better opinion of the taſte and appreciation of the Britiſh public than he had before conceived, and began to find himſelf and his talents more an object of attention than his modeſty had allowed him to ſuſpect.

That he did not go, is, on the whole, to be regretted, as the ſoft air and genial climate of Italy would probably have lengthened his life; and with length of life, his reputation would have increaſed, and the public at large have been proportionably benefited: for it has been juſtly ſaid of his latter productions, that they were marked by a wonderful degree of improvement, and that, had his life been prolonged, the fruits of this improvement would probably have been multiplied in abundance. The circumſtance of his premature death gives, therefore, freſh cauſe to lament that the patrimony and the acquiſiiton of genius are unalienable, and can never be bequeathed; and that talents, however rich, and however verſatile, muſt inevitably periſh with their poſſeſſor.

He died at his houſe at Brompton, of a pulmonary complaint, which had for ſome time been gradually undermining his conſtitution, on the 14th day of June 1810, and was attended to his grave, in Paddington church-yard, by a long and numerous proceſſion of artiſts and amateurs, who loved and honoured his merit as an artiſt, and his probity as a man.

In his perſon, Schiavonetti was rather tall; the fine proportion in the diviſions of his figure gave him a graceful movement; his manners were gentle; in his addreſs there was ſweetneſs and affability; and perſuaſion hung on his lips. He was dignified without auſterity, and meek without inſipidity. His whole deportment was manly. His amiable modeſty of character, equability of temper, and promptneſs to oblige, won the good will of all who ſaw and converſed with him. In company with his brother artiſts, he ſeemed unconſcious of his own ſuperiority: though fitted to rank with the higheſt, he exacted no diſtinction of notice, but kept himſelf on a level with the loweſt; and by the deference with which he ſpoke his opinions, made every one feel at eaſe in his ſociety. This urbanity of manners, is but too commonly an extrinſic accompliſhment; but in him it was the unaffected expreſſion of innate goodneſs of heart, and liberality of mind. It was not the varniſh of a coarſe material, but the poliſh of a fine one. Many acts of his private life might be adduced in ſupport of what is here ſaid in his praiſe:—one may be ſelected that exhibits a trait illuſtrative of his whole character. As ſoon as he began to derive profit from his profeſſion, he devoted a portion of it to the ſupport of his poorer relatives in Italy; and of late years he conſtantly remitted to his aged parent a ſtipend ſufficient to enſure him comfort and reſpectability.

The ſame energy and elegant ſimplicity, which was obſervable in the perſonal character of our artiſt, predominated alſo in his engravings. He poſſeſſed, in very high perfection, that firſt requiſite both in painting and engraving, freedom blended with accuracy of delineation. This power, united to the grace and dignity which characterized his ſtyle, enabled him to treat every ſubject on which he exerciſed his talents, with a truth, diſtinctneſs, and propriety of expreſſion, rarely to be found in the works of other artiſts. By a varied choice of models, and a bold and independent habit of thinking, in particular, by fixing his attention ſtrongly on the merits of the beſt works of our countrymen Strange and Sharp, he enfranchiſed his mind from the dogmas of ſchool diſcipline, (which is ſaid without any particular reference to his early tutors,) and ſtood forth an original, and if not a ſelf-taught, a ſelf-reformed engraver. In the works of common artiſts, we ſee only the labour of the hand; but in his, the hand is manifeſtly directed and controlled by the mind. What is their ultimatum, was only his inſtrument: he handled it with perfect command; he thought over it with nice diſcrimination; and as ſtagnation in the world of art, as well as in the phyſical world, engenders corruption, and as *manner* is the corruption of *ſtyle*, Schiavonetti has entitled himſelf to all the praiſe that Mr. Cromek (from whoſe memoir of this artiſt our account is partly extracted) has beſtowed on him, for the dignified eaſe with which he kept far aloof from that mechanical ſameneſs on all occaſions, which we denote by this term, and for always preſerving that ſuperintending mental delicacy, that ſtore of knowledge, and that fine ſtate of nerves, which enabled him to vary and adapt the language of his art to the peculiar beauties and merits of the various originals, which from time to time he had to tranſlate. Some of his leſs informed critics have praiſed the *beauty* of his manual execution. It *is* beautiful; but to ſay ſo, is like praiſing the perſonal beauty of Lucretia. Dazzled by the ſun-beams which glitter on its ſurface, they fathom not the depth, and know not the navigable benefits, of the current. But perhaps poſterity will but gradually learn to appreciate his merits as they deſerve.

That his powers were not leſs verſatile than vigorous, may be ſeen by comparing his etchings with his chalk engravings, and both with his exquiſitely finiſhed plates in lines; of which latter, owing to the bad taſte that has hitherto prevailed ſince his arrival in this country, the number is unfortunately ſmall.

His principal *engravings in the Chalk manner*, are, two, of "The Five Senſes," which, with the frontiſpiece, form a ſet of ſix plates, in ſmall folio, all from his own deſigns; "The Meſſiah hurling Thunder," after R. Weſtall, R. A. for Boydell's edition of Milton, large 4to.; "The Body of Tippoo Sultân recognized by his Family, after the Capture of Seringapatam," from R. K. Porter, in large folio; a ſet of the Cries of London, in large 4to.; three, of a ſet of the ſacraments, after R. Weſtall; "Puck, ſeated on a Muſhroom," after ſir Joſhua Reynolds; a ſet of four folio plates, from the deſigns of Benazech, of "The Sufferings of Louis XVI. during his Captivity in the Temple;" "Queen Elizabeth receiving News of the Death of Queen Mary of Scotland," after R. Weſtall; "The red Slippers," from the ſame painter; two folio plates for Boydell's Shakeſpeare, of which, one in particular, "The two Gentlemen of Verona," after Angelica Kauffman, is a very capital print. The name and talents of Schiavonetti were but little known when he undertook this plate, and he engaged to engrave it for the low price of two hundred and eighty guineas. It is to the credit of the late Mr. Boydell, that he voluntarily increaſed this ſum to three hundred. The portraits of Albert Rubens, after Rubens, in folio; the queen of Pruſſia, after Tiſchbien; and the duke of York, after J. Boyle, both in folio; Mrs. Damer, after Coſway, in 4to.; and the right honourable W. Pitt, and lady Cawdor, in ſmall folio, after Edridge.

But far beyond theſe in merit and importance, is a large folio print of "The Landing of the Britiſh Troops under Gen. Abercrombie in Egypt," after de Loutherbourg, in which the fire, freedom, and vigorous chiaroſcuro of that maſter are moſt happily rendered, and for the production of which, the ſociety in the Adelphi for the Encouragement of Arts, &c. did themſelves the honour of preſenting the engraver with a medal. By a judicious admixture of ſtippled hatchings, in imitation of chalk drawing when performed by the hand of a maſter, Schiavonetti has here revived, with ſuperior brilliancy and effect, the real chalk manner of engraving, which we call thus in contradiſtinction to Ryland's art of imitating ſtumpted drawings, or what the French aptly term "en manière de crayon noir," and has even enlarged the former boundaries of this mode of art. On the whole, this is probably the moſt perfect chalk-engraving that has yet been executed, and of itſelf, would be a monument of reputation in this branch of the art.

The chief of his *etchings* are, a ſet of twelve, in ſmall folio, from drawings by W. Blake, of which the ſubjects are taken from Blair's poem of the Grave. Theſe are works of great merit, and (as we venture to pronounce) of laſting reputation; and though it be too true, that, in the words of this poet,

> "The beſt concerted ſchemes men lay for fame
> Die faſt away; only themſelves die faſter:"

they yet prove, in oppoſition to his leading ſentiment, that it is *not*

> "Abſurd to think to over-reach the grave,
> And from the wreck of names to reſcue our's."

Faithfully adhering to the character of art that is implied by the term *etching*, Schiavonetti is here ſlight and ſketchy, and has produced his effects chiefly by the operation of aquafortis, with his uſual fine feeling, and a congenial unſtudied ſimplicity of ſtyle. The eye of diſcernment immediately ſees that the ſame high finiſhing which he beſtowed on his plates after Vandyke, was never intended, and that what was intended is preciſely accompliſhed.

Of this ſeries of meritorious etchings, which were printed with Blair's poem and an able preface by the profeſſor Fuſeli, and publiſhed by Mr. Cromek, the ſubjects are 1. The Deſcent of Chriſt into the Grave; 2. The Deſcent of Man into the Vale of Death; 3. Death's Door; 4. The ſtrong and wicked Man dying; 5. The good old Man dying; 6. The Soul hovering over the Body; 7. The Soul exploring the Receſſes of the Grave; 8. The Counſellor, King, Warrior, Mother, and Child in the Tomb; 9. The Skeleton re-animated; 10. The Re-union of Soul and Body; 11. A family Meeting in Heaven; and 12. The Laſt Judgment. Theſe are preceded by a portrait of Mr. W. Blake, the poetic deſigner of the work, after T. Phillips, R. A. in which our engraver has manifeſted great judgment and taſte. It is alſo an etching, treated in the vignette ſtyle, with ſmall aſſiſtance from the graver and dry-point, where a certain degree of mellowneſs or blending were wanted, and the whole brought to a focus in the animated and thinking countenance which is the proper ſubject of the print. Two etchings after Caracci, in folio, were afterwards finiſhed in aquatinta, for Mr. Chamberlayne's work from the Royal collection; two unpubliſhed large folio plates of "The Departure, and the Return, of the Savoyard Muſicians," ſlight, but performed with ſingular felicity.

Finiſhed Engravings.—"The Madre Doloroſa," or dead Chriſt on the lap of his Mother, after Vandyke, which he engraved in ſmall folio, for the French publication, after their national gallery at Paris, is of a diſtinct claſs and character from the above; more elaborate, more difficult of accompliſhment, and combining merits of a loftier and more exquiſite kind.

Here the mellow and harmonious mixture of etching, with the work of the graver and dry needle; the various combinations, by means of theſe inſtruments, of clear, broken, contraſted, and partially obſcured, lines and ſtippling, by which he has expreſſed in their reſpective degrees of ſubordination to the purpoſe of the painter, rock, ſky, hair, white and coloured draperies, and, above all, the anatomical markings, carnation tints, and fleſhy texture, of the exquiſitely finiſhed naked figure of Jeſus Chriſt, are truly admirable: and if not unparalleled, have certainly not been ſurpaſſed. Nor are the extremities of every figure in the compoſition rendered with leſs of taſte, knowledge, or ſkill. Bolſwert had engraved a larger print of this ſubject from Vandyke's original picture, a print of great merit; and to a nice obſerver, it is intereſting to compare the details of the two engravings, and ſee how ſedulouſly, and with what delicacy of diſcernment, the Italian artiſt has avoided every error, and improved every beauty, of the Fleming.

It is exceedingly to be regretted that among the works of Schiavonetti, we find ſo few of this inimitable claſs, for no man more than he, has united the excellencies which muſt enter into the conſtitution of a highly finiſhed engraving. Another of theſe highly finiſhed engravings, which is alſo after Vandyke, and of large 4to. ſize, is a portrait of the painter himſelf, habited as a peaſant, and the ſame general obſervations will apply to both, for both are admirable epitomes of the powers of Vandyke; of the latter it has been truly ſaid, that "its excellencies will be found to conſiſt in its being at the ſame time a complete epitome of the original picture and of the powers which an engraver of genius can diſplay upon ſo confined a ſubject as a half-length figure, without landſcape, ſky, or any other accompaniment of back ground. It is throughout quite as well drawn as Vandyke's original; the texture of fleſh is as perfectly expreſſed, with all its varieties and inflexions of ſurface and chiaroſcuro; nor is the drapery leſs well felt and underſtood, nor ſcarcely leſs ſkilfully engraven, than the naked parts of the figure; all are ſufficiently finiſhed, but without petty trickery, or vain labour, and the eye ſparkles with all the fire of Vandyke's."

Theſe remarks are taken from "The Review of Art," (vol. i. p. 40.) which proceeds to ſtate what is equally applicable to both theſe engravings after Vandyke, namely, that "in addition to all their other perfections, they powerfully ſuggeſt the idea of colour, mingling its magic blandiſhments with thoſe of light and ſhade; and preſent the moſt perfect example we have yet ſeen on paper of the ſtyle of Vandyke's pencilling, and Vandyke is in this reſpect the very perfection of ſtyle, or at leaſt approximates the neareſt to it of any painter whatever, except perhaps Fyt, who exerciſed his powers on ſubjects of quite a different kind."

Another 4to. plate, which our artiſt engraved after a very excellent picture by R. Smirke, R. A. as an accompaniment to Joel Barlow's Columbiad, and of which the ſubject is "The Triumph of the Holy Inquiſition;" ſome plates which he engraved for Sharpe's Britiſh Claſſics, and two for an edition of Homer, after the academicians Fuſeli and Howard, poſſeſs merits of a ſimilar kind, though, on account of the ſmallneſs of the ſcale, they could not be ſo effectually diſplayed.

The remainder of his finiſhed engravings in lines, are the hovel ſcene in King Lear, after Smirke; and two or three other plates for the ſmaller edition of Boydell's Shakſpeare, which are among the very beſt in that motley and undigeſted work; and ſome ſmall portraits, particularly one of Mr. W. Cunningham (an Iriſh gentleman, diſtinguiſhed for his taſte and patronage of the fine arts); another, of a writing maſter, well known and diſtinguiſhed in his profeſſion, and a buſt of Homer, from the celebrated marble in the Townleian Collection, all of 8vo. dimenſions.

His folio print, engraved in the fourth remove from Michael Angelo's celebrated Cartoon of Piſa, is of a middle character, leſs elaborate than his prints from the pictures of Vandyke, though ſomewhat more ſo, than his etchings after the poetical ſketches of Mr. Blake: in ſhort, a graphic tranſlation of a Cartoon, or preparatory ſtudy for a high-finiſhed picture.

His academical knowledge and ſkill were here, perhaps more than in any other of his productions, called into action, and their ſtrength put to the teſt. Nothing ſtood higher in theſe reſpects than the reputation of the great original, which is even, by Benvenuto Cellini and other excellent judges, eſteemed the maſterpiece of Michael Angelo: and this high reputation Schiavonetti had not merely to ſuſtain, but in ſome degree to reſtore; for the Cartoon itſelf being deſtroyed (in a fit of envy, as it is ſaid, by Bandinelli, who was entruſted with the key of the apartment where it was placed,) and the details of its ſuperlative merits being known to us moderns, only through the media of Sangallo's copies, and the ſeparate groups which have been engraven by Marc Antonio, Agoſtino of Venice, and other contemporary artiſts, whoſe works we have already enumerated under an early part of this article of the Italian ſchool, our engraver felt it to be his duty to collate theſe verſions and fragments of the Cartoon of Piſa with conſcientious ſcrupuloſity, and, by balancing probabilities, to reſtore what may be called the true claſſical reading. An awful taſk! yet which he has performed with the ability and ſucceſs of a conſummate ſcholar in art.

The reader ſhould be appriſed, that the Holkham copy, which is believed to be the work of Baſtiano de Sangallo (an artiſt who was never held in any very high degree of eſtimation) was painted in his old age, from a ſmall drawing which he had himſelf copied from the original Cartoon in the year 1542, during his pupilage. It was made at the requeſt of Vaſari, and, through means of Monſignor Jovio, came into the poſſeſſion of Francis I. of France, who highly eſteemed it; from his collection it however diſappeared, and no mention is made of it by the French writers for near two centuries. It was probably diſcovered at Paris, purchaſed, and brought to England by the father of the late marquis Townſhend.

Schiavonetti had not even this copy to work from, but a copy of this copy, and has therefore, with commendable regard for his own reputation, and that of Michael Angelo, and with due reſpect for the public, who always ought to be rightly informed upon ſuch occaſions, followed the recommendation which was publicly laid before him in the Review of Art, vol. i. and ſcratched with his dry needle under the few proofs which were received as preſents by his friends, "Engraved by L. Schiavonetti, after a copy painted by H. Howard, R. A. from da Sangallo's copy of his own ſtudy, after Michael Angelo's cartoon."

The ſame reſpect for truth and the public, which dictated this recommendation and this conduct, requires us to mention that Schiavonetti has corrected a general heavineſs of drawing which prevails in Mr. Howard's picture, which heavineſs that accompliſhed artiſt no doubt found in the Holkham copy, but which is perfectly inconſiſtent both with the active ſentiment of the ſubject, and the earlier graces of Michael Angelo's compoſition. A foot of one of the principal figures, which is there turned inward, he has turned outward; and, beſide ſome other minor details, has added requiſite ſtrength to the hams of the figure who is climbing the rocky bank of the Arno. Whether our artiſt had ſeen the ſmall fragment of Michael Angelo's original, which is ſaid to be ſtill in exiſtence at Mantua, or of what part or parts that fragment may conſiſt, the preſent writer is not able to ſay; but Schiavonetti was in poſſeſſion of various old prints of its principal groups, of which we have already ſpoken in our accounts of Marc Antonio and his diſciples, and which were executed for the moſt part during the lifetime of Michael Angelo, and from comparing them, and reflecting on the whole, has ventured on the above emendations of the extant copies.

As this cartoon of Piſa is eſteemed to have been one of the moſt extraordinary works that has been produced ſince the revival of art, the reader will not be diſpleaſed to find here the following eloquent account of it, as delivered from the profeſſor's chair of the Royal Academy of London, by M. Fuſeli. It does not in all its details exactly tally with the print, but its general ſentiment of impatient animation and patriotic ardour is preciſely the ſame. "It repreſents an imaginary moment relative to the war carried on by the Florentines againſt Piſa; and exhibits a numerous group of warriors, rouſed from their bathing in the Arno, by the ſudden ſignal of a war-horn, and ruſhing to arms. In imagining this tranſient moment from a ſtate of relaxation to a ſtate of energy, the ideas of motion, to uſe the bold figure of Dante, ſeem to have ſhowered into the artiſt's mind. From the chief, nearly placed in the centre, who precedes, and whoſe war-voice accompanies the trumpet, every age of human agility, every attitude, every feature of alarm, haſte, hurry, exertion, eagerueſs, burſt into ſo many rays, like the ſparks flying from a red-hot iron. Many have reached, ſome boldly ſtep, ſome have leaped, on the rocky ſhore; here two arms emerging from the water grapple with the rock; there two hands cry for help, and their companions bend over or ruſh on to aſſiſt them; often imitated, but inimitable, is the ardent feature of the grim veteran, whoſe every ſinew labours to force over the dripping limbs his clothes, whilſt gnaſhing, he puſhes his foot through the rending garment. He is contraſted by the ſlender elegance of a half averted youth, who ſedulouſly eager buckles the armour to his thigh and methodizes haſte; another ſwings the high-raiſed hauberk on his ſhoulder, whilſt one who ſeems a leader, mindleſs of dreſs, ready for combat, and with brandiſhed ſpear, overturns a third, who is crouched to graſp a weapon; one naked, himſelf buckles on the mail of his companion, and he, turned toward the enemy, ſeems to ſtamp impatiently the ground. Experience and rage, old vigour, young velocity, expanded or contracted, vie in exertions of energy; yet in this ſcene of tumult one motive animates the whole, eagerneſs to engage with ſubordination to command; this preſerves the dignity of action, and from a ſtraggling rabble, changes the figures to men whoſe legitimate conteſt intereſts our wiſhes."

Three plates in lines, which he advanced no further than the aquafortis ſtate, will cloſe our liſt of the works of this admired and regretted artiſt. The firſt, in the order of production, is a maſterly etching of large folio ſize, after Trumbull, of "The Death of General Montgomery," which was finiſhed by Mr. Clemens (a German artiſt). It was performed ſeveral years ago, and diſcloſed powers which ought to have made an earlier impreſſion than they did on the eye and taſte of the public. The next is "The Proceſſion of Chaucer's Pilgrims to Canterbury," a large folio plate of the frieze proportions, after a very capital work from the pencil of the academician Stothard.

Chaſtening every ambitious diſplay of his own executive powers; repreſſing every idea and every feeling that was not homogeneous with the nature, and proportioned to the demands of the occaſion, Schiavonetti has here, like the hero of the Odyſſey, expreſſed, "no more than juſt the things he ought." The ſpirit which animated him in the performance of this work, like that which has animated the painter, ſeems to have glided from the elyſium of the great artiſts of antiquity; there is the ſame truth of Nature, and the ſame unoſtentatious claſſic purity of ſtyle, pervading the whole;

"Enlight'ning ev'ry line in ſuch a guiſe,
That they ſeem rather fallen from the ſkies
Than of a Mortal hand."

Since the lamented death of Schiavonetti, the proprietor of this plate has with ſome inconſiſtency ſtated to the public, that, "in the preſent ſtate of this etching, conſidered with reference to the peculiar circumſtances of the caſe, perhaps no better mode could be deviſed of paying an impreſſive and laſting tribute to his memory, and one in which all his admirers could participate, than by giving it to the public as he left it, a conſecrated monument of his genius;" he has before held forth a powerful additional motive to this end, a motive as powerful as taſte and friendſhip themſelves could have connected with ſuch a purpoſe, by informing his readers, that "the movement of the figures and the expreſſion in their heads and characters are as finely maintained in outline, as they could poſſibly have been in the moſt finiſhed print," which is pretty ſtrong language, yet he has ſince announced Mr. Bromley and himſelf as the finiſhers of the plate.

Now, though the preſent writer does not think finiſhing, in the engraver's art, is thus utterly thrown away, or contributes nothing in addition to an exquiſite outline, to the motions, characters, and expreſſions of a protracted group of figures, ſuch as the Canterbury pilgrims; or though, regarding the above as an impaſſioned, or hyperbolic ſentence from the pen of Mr. Cromek; he can make due allowance for the occaſion which gave it birth, he yet thinks the impreſſive and laſting tribute to the memory of Schiavonetti ſhould have been paid; the monument which his genius itſelf had raiſed ſhould have been conſecrated; and he therefore regrets thoſe views of profit, or thoſe hopes of reputation, or thoſe ulterior miſtakes which have prevented this conſummation. Achilles and Ulyſſes could not both be the heroes of the ſame poem; and it would have been wiſe for Mr. Bromley, and well for the public, for him to have begun *his* Canterbury pilgrims on a freſh plate of copper.

The next, and the laſt of our artiſt's performances, was an etching, of folio dimenſions, of the portrait of ſir Joſeph Banks, as preſident of the Royal Society, from a picture by T. Phillips, R.A. replete with that truth of character and mild force of execution, which uſually diſtinguiſh the works of this painter. To detail the merits of this work, would be but to call forth afreſh our former praiſes; it is as maſterly a diſplay of his talent in the portrait branch of his art, as the etching of the Canterbury pilgrims is of his merit in the hiſtorical. This plate, as we are given to underſtand, is now finiſhing by Nicholas Schiavonetti, who may naturally be preſumed to be at leaſt as well acquainted with his brother's ſtyle and profeſſional intentions, as any engraver whatever.

Of Franciſco Bartolozzi of Florence, the pupil of Wagner, but more the pupil of Italy and nature, and the principal inſtructor of Schiavonetti and Volpato, we ſhall ſay but little. He is ſtill at upwards of fourſcore years of age, conſidered as ſpeaking for himſelf by his productions, though doomed to linger out the evening of his glorious day, in Portugal, far from the haunts of ſtudious retirement, and amidſt the din of arms. Till nature has cloſed her account with him, what bold auditor ſhall preſume to eſtimate his worth?

Of him and his diſciple Schiavonetti, we have already ſpoken as two of the brighteſt ſtars in our graphic hemiſphere. The latter has fallen from his zenith: that Bartolozzi may long remain above the horizon, is our fervent wiſh.

But it has been emphatically ſaid, that "ſtars teach as well as ſhine." On the continent of Europe, they teach and ſhine in vain, while war deſolates the plains of the weſtern peninſula; if Ate flings wide and wild her torch, in vain exiſt the charms and the leſſons of art: in vain are the heavens ſerene, if an earthquake rages below.

ITALIC, or Italian *Hours*, are the twenty-four hours of the natural day accounted from the ſun ſetting of one day to the ſame again the next day.

This way of reckoning was uſed by the Jews of old, and is uſed by the Italians to this day.

Italic *Character*, in *Printing*. See Letter.

Italic *Sect*, is the name of a party of ancient philoſophers founded by Pythagoras; ſo called, becauſe that philoſopher taught in Italy, ſpreading his doctrine among the people of Tarentum, Metapontus, Heraclea, Naples, &c. See Pythagoric *Sect*.

ITALY, in *Geography* and *Hiſtory*. In ancient geography, this country, the moſt celebrated in Europe, was denominated Italia. It is bounded on the N. and N.W. by the Alps; on the E. by the mare Superum, that is, the Adriatic gulf, or gulf of Venice; on the W. by the mare Inferum, or Tuſcan ſea; and on the S. by the Ionian ſea adjacent to Greece. In form, it has been compared to the ſhape of a boot, lying in an oblique direction from N.W. to S.E. From the Alps to the fretum Siculum, or ſtrait of Meſſina, it extends from 47° to 37° 45′ N. lat. or about nine degrees. In breadth it is very unequal, in ſome places not exceeding 2°, and in others upwards of 8° long.; hence its length from N. to S. is about 600 miles, and its breadth varies from 1 to 300 miles or more. It has borne at different periods very different names. One of its moſt ancient names was Italia, either from Italus, a king of that country, not known in hiſtory, or from a Greek word ſignifying an ox, an animal very common in that part of the country. It was denominated "Heſperia," on account of its weſtern ſituation in reſpect to Greece; "Saturnia," from Saturn; "Latium," from the Latini; "Auſonia," from the Auſones; "Oenotria," from a tribe ſettled between Pæſtum and Tarentum. Theſe names were originally appropriated to particular provinces, but in proceſs of time they were applied to the whole country, which has been denominated the garden of Europe. The ancient inhabitants called themſelves aborigines, offspring of the ſoil; and the country was, at a very early period, peopled by colonies from Greece. The Pelaſgi and Arcadians made ſettlements there, and the whole country was divided into as many different governments as there were towns, till the rapid increaſe of the Roman power changed the face of Italy, and united all the ſtates in ſupport of one common cauſe. (See Rome.) Under the dominion of the Gauls and Greeks, Italy, in reference to its inhabitants, was divided into "Gallia Ciſalpina," "Italia Propria," and "Græcia Magna:" the firſt comprehended the provinces lying between the Alps, and the Rubicon; the ſecond included the intermediate provinces; and the third thoſe adjacent to Sicily and Greece, and inhabited chiefly by Grecian colonies. It was divided into eleven ſmall provinces or regions by Auguſtus; but according to the common and moſt approved diviſion, ancient Italy conſiſted of two parts, *viz.* "Gallia Ciſalpina," and "Italia Propria:" the former, likewiſe called "Gallia Italica," and ſometimes "Gallia," was bounded on the N. by Rhætia, and on the S. by the ſinus Liguſticus, or gulf of Genoa. This province, while under the Roman dominion, contained ſeveral tribes, which will be noticed in their places. Italia Propria was on all ſides ſurrounded by the ſea, except on the N. where it was bounded by an imaginary line, extending from the mouth of the Macra to that of the Rubicon. It contained, among others, the following provinces, *viz.* Etruria, Sabinum, Latium, Campania, Samnium, Apulia, Meſſapia, Lucania, and Brutium. During the middle ages Italy underwent many revolutions, and frequently changed its maſters. In the reign of Honorius the Viſigoths, under the command of Alaric, penetrated into that fertile country, which they plundered from the foot of the Alps to the ſtrait of Sicily. The reign of the Goths in Italy ended in Teia, Totila's ſon, who was defeated and ſlain by Narſes in the year 553. Italy now became a province of the Greek empire. The Lombards were a fierce nation, firſt diſcovered between the Elbe and the Oder, from thence they deſcended to the ſouth and the Danube. They afterwards paſſed the Danube, wandered along the coaſt of the Adriatic, and in the year 566, aided by the Avari, a Scythian horde, they undertook the conqueſt of Italy. Many provinces were added to their dominions, as a large portion of the Venetian territory, Tyrol, Milaneſe, Piedmont, the coaſt of Genoa, Mantua, Parma, and Modena, the grand duchy of Tuſcany, together with a conſiderable portion of the eccleſiaſtical ſtate.

Italy, in the modern acceptation of the word, includes both main land and iſlands. The former, by geographers, is commonly divided into upper, middle, and lower. Upper Italy, called Lombardy, contains ſeven duchies, ten ſmall principalities, and two republics. Middle Italy conſiſts of the grand duchy of Tuſcany, the eccleſiaſtical ſtate, and two republics. Lower Italy includes a part of ancient Italia Propria, and the kingdom of Naples. The climate of this country differs with its different diviſions. In mountainous diſtricts the air is keen and piercing; the provinces, north and eaſt of the Apennines, are mild and temperate; thoſe on the S. of that chain are warm, ſultry, and liable to torrents of rain. An account of the mountains, rivers, and lakes, belonging to Italy, or dividing it from other countries, will be found in the alphabetical order of this work. (See Alps, Apennines, Po, &c.) There is a very conſiderable diverſity in the ſoil as well as the climate. The northern diviſion exhibits the grand ſcenery of the Alps, contraſted with delightful vallies and plains, watered by many ſtreams which run towards the ſouth to augment the Po. In the central parts are marſhes, ſtagnant waters, and fruitful diſtricts. A great proportion of the kingdom of Naples (which ſee) is hilly, but many tracts, though ſubject to inconveniencies, are uncommonly fertile. Italy has been denominated the parent of plenty, and each province has its peculiar excellence and commodity; and, taken together, they all yield the comforts and luxuries of life in great abundance. In the time of Pliny, Italy was ſaid to contain 14,000,000 of inhabitants. This was probably an exaggerated account. The preſent population, though not eaſy to be got at, cannot, with the iſlands of Sicily and Sardinia, be eſtimated at more than 13,000,000. Naples and Sicily are ſuppoſed to contain 6,000,000; the central part about 3,000,000; and the northern about 4,000,000. The manners and cuſtoms of the natives are various and diſcordant. The real Italians are in general well proportioned, affable, polite, profuſe in their compliments, and nice in all punctilios of civility, obſerving, it is ſaid, a due medium between the levity of the French and the gravity of the Spaniards. They are impetuous in their temper, keen in their reſentments, revengeful in their manners, and ſuperſtitious in their religion. "Attached," ſays Mr. Playfair, "to ancient cuſtoms, they apprehend no occaſion for improvement. Conceiting themſelves to be the conquerors of the world, they look on the reſt of mankind with contempt. Out of a vain oſtentation, they laviſh their money on paintings, gardens, and ſtatues, on coſtly equipages, and a numerous retinue of ſervants; but this profuſion does not ſeem to interfere with the economy of their tables, which are neither ſplendid nor expenſive. Their dinner, conſiſting principally of roots and vegetables, is a ſlight meal compared with their ſupper; but at all times they eat and drink ſparingly. Their houſes, furniture, and entertainments, are a compoſition of magnificence and meanneſs. While they delight in outward ſhow, they beſtow little attention on the comforts of life. Maſquerading, gaming, converſations, muſic, and religious exhibitions, are their chief amuſements." The dreſs of the Italians is not materially different from that of the inhabitants of the neighbouring countries; and it has been obſerved, with much juſtice, that Italy, inſtead of being viſited by travellers for the ſake of its inhabitants, is viſited only for the ſake of the places which they inhabit. There are ſome remains of foreſts among the Apennines; but the early civilization of Italy has been diſadvantageous to the growth of timber. The botanical products of Italy are ſuppoſed to be equal to thoſe of any European country, on account of the great variety of its ſoil, the irregularity of its ſurface, and the genial benignity of its climate. In the ſouthern parts, cotton, rice, and the ſugar-cane, indicate the fertility of the ſoil, and the warmth of the climate; and the fields and the paſtures bear a ſtriking reſemblance, in their native products, to thoſe found in the ſouthern provinces of Spain. The Italian horſes are of little reputation, and the cows, from which the noted Parmeſan cheeſe is made, are deſcribed as of a deep red colour, long, lank, and ill made. In Tuſcany the art of fattening cattle is well underſtood. The buffalo is, in Europe, almoſt peculiar to Italy. This animal in ſome reſpects reſembles the hog, being fond of wallowing in the mud; his fleſh is coarſe, and his hide, though light, is ſo firm as to have ſupplied armour to the military. The marmot and the ibex are reckoned among the animals of the Apennines, and the creſted porcupine is eſteemed peculiar to the ſouth of Italy. The Alpine diſtrict abounds in rich mines which are neglected: here are mines of ſilver, lead, iron, copper, and gold: in many parts there is excellent coal, and in detached hills throughout the country, marble, lime-ſtone, metallic ores and minerals are found. There are but few manufactures in Italy in proportion to the fertility of the ſoil. Thoſe of ſilk and wool are carried on to a conſiderable extent: but great quantities of the raw materials are exported. Beſides theſe, wine, oil, and fruits are exported in abundance. The chief imports are hard ware, metals, cotton, woollen and ſilk ſtuffs, leather, timber, pitch, &c. The ſkill of the natives in ſtatuary, painting, and architecture, has been long the ſubject of admiration. The eſtabliſhed religion is the Roman Catholic, conſiſting chiefly in external obſervances, rites, and ceremonies. The pope is ſtill looked up to as the head of the church; but his power and influence are now almoſt wholly deſtroyed. Before the late revolution, the form of government in the ſtates of Italy was monarchical, and in the republics it was ariſtocratical. The ſovereigns governed their dominions with unlimited authority: in the republics of Venice, Genoa, and Lucca, the nobility ſhared in the management of the ſtate. In the preſent unſettled ſituation of the country it is not poſſible to give any tolerable eſtimate of the revenues: they were reckoned between four and five millions ſterling towards the cloſe of the laſt century. Anciently, Italy gave birth to men illuſtrious in almoſt all the departments of ſcience then cultivated: the generals, philoſophers, hiſtorians, orators, and poets of Rome can never be forgotten. In the ſixth century, when numerous tribes of barbarians overran the Roman empire, ſcarcely a veſtige of literature and the fine arts remained. From this period until the 16th century, the human mind ſunk into profound ignorance, but ſince the revival of learning very many eminent perſons have appeared in Italy that have adorned the ſciences and the various branches of literature. The elegant arts of ſculpture, painting, architecture, and muſic have likewiſe been cultivated with ſucceſs.

We have already alluded to the early hiſtory of Italy, which, in a few lines, we brought down to the invaſion, and, indeed, conqueſt of that country by the Lombards. The great object of ambition to this new race was the entire conqueſt of all Italy, and this, as in almoſt all other ſimilar caſes, proved the ruin of their empire by Charles the Great, or, as he is generally denominated, the illuſtrious Charlemagne, who was crowned ſovereign of that country in the year 800. As, however, the Lombards had never poſſeſſed the whole of Italy, ſo the whole of it never came into the poſſeſſion of Charlemagne, nor, indeed, ſince the time of the Goths, has the whole extent of this country been under the dominion of any ſingle ſtate. The undiſputed territory of Charlemagne in Italy was reſtricted to Piedmont, the Milaneſe, and the Mantuan territories, thoſe of Genoa, Parma, Modena, Tuſcany, Bologna, the dukedoms of Friuli, Spoleto, and Benevento, the laſt of which contained the greater part of the preſent kingdom of Naples. The feudal government which the Lombards had introduced into Italy produced ſeveral revolts, as the different dukes inclined, either to change maſters, or to ſet up for themſelves. Several of theſe rebellions happened during the life of Charlemagne, which, by the vigour of his mind and the deciſiveneſs of his meaſures, he found means to cruſh; but after his death, the ſovereignty of Italy became an object of contention between the kings of France and the emperors of Germany. That monarch had divided his extenſive dominions among his children; but they all died during his own reign, excepting Lewis, whom he aſſociated with himſelf in the empire, and who ſucceeded to all his dominions after his death. Hence are dated thoſe troubles with which Italy was ſo long overwhelmed, and of which, as they proceeded from the ambition of thoſe called kings of Italy and their nobles, of the kings of France, and the emperors of Germany, it would be difficult to give our reader any ſatisfactory account, although we were to extend the boundaries of the preſent article much beyond the limits that can be allowed it. We ſhall attempt only an outline. At the time when Lewis, the ſon of Charlemagne, was declared emperor of the Weſt, Italy was held by Bernard, the ſon of Pepin, brother of Louis. Though Bernard bore the title of king, he was only accounted a vaſſal of the emperor. He ſoon rebelled againſt his uncle, but being abandoned by his troops, and taken priſoner, he was deprived of his ſight, and died in a few days; and in 823 the eldeſt ſon of the emperor was ſent into Italy, of which country he was crowned king at Rome, and afterwards emperor of the Weſt during his father's life-time. He alſo rebelled againſt his father, whom he took more than once priſoner, though in the end he was obliged to ſubmit, and aſk pardon for his offences. In the mean time the Saracens, taking advantage of the civil commotions, landed on the coaſts of Italy, and committed ſuch ravages, that even the biſhops were obliged to arm themſelves in defence of the country. Lothaire took but little care to put an end to theſe ravages, or to reſtore tranquillity, he even embroiled himſelf ſo far till he had loſt almoſt all his dominions: at length he died, leaving his ſon Lewis the title of emperor, as well as that of king of Italy. Lewis applied himſelf to the reſtoratioa of tranquillity in his dominions, and the driving out of the Saracens from thoſe places of which they had poſſeſſed themſelves in Italy. This arduous taſk he fully accompliſhed, and obliged the infidels to retire into Africa, but in 875 he died, without naming a ſucceſſor. After this event, the Italian nobles, headed by the duke of Tuſcany, repreſented to the pope, that as Lewis had left no ſucceſſor, the regal dignity, which had been ſo long uſurped by foreigners, ought now to return to the Italians. The pope, however, crowned Charles the Bald of France emperor and king of Italy, on the condition of his acknowledging the independency of Rome, and that he himſelf only held the empire by the good-will and gift of the pope. This produced a ſerious conſpiracy among the diſcontented nobles, of which the Saracens took advantage, renewed their incurſions, and even threatened the eccleſiaſtical territories with the utmoſt danger. The pope earneſtly ſolicited the emperor's aſſiſtance, but that prince died before he could afford him any effectual aid, and being diſtreſſed by the Saracens on the one hand, and the Lombard nobles on the other, the wretched pontiff was forced to fly into France. Italy now fell into the utmoſt confuſion and anarchy; during which, many of the nobles and ſtates of Lombardy aſſumed an independence which they have ever ſince retained. The pope, in 877, was re-conducted to Italy by Boſon, ſon-in-law to Louis II. of France, whom the pontiff would willingly have raiſed to the dignity of king of the country, but he found his intereſt inſufficient for the purpoſe, and matters remained in their former ſituation. The nobles became reconciled to the pope, but they renounced the authority of any ſuperior, and every one claimed to be an independent ſovereign of his own territories: they even applied to the pope, and requeſted him to join in aſſerting the independency of Italy, and obtained from his holineſs the two following decrees; *viz.* That the popes, after their election, might be conſecrated, without waiting for the preſence of the king, or his ambaſſadors; and that if Charles the Groſs died without ſons, the kingdom of Italy, with the title of emperor, ſhould be conferred on ſome Italian nobles. The emperor felt himſelf neglected and inſulted, and complained bitterly of being deprived of his right, and the diſſentions between the Italian nobles became more fatal than ever. Two of theſe noblemen, Berengarius, duke of Friuli, and Guido, or Vido, duke of Spoleto, entered into an agreement, that on the death of the emperor, the former ſhould ſeize the kingdom of Italy; and the latter on the kingdom of France. Berengarius ſucceeded without oppoſition, but Guido was diſappointed: upon this he returned to Italy, and turned his arms againſt Berengarius, whom he drove into Germany, and obtained for himſelf the kingdom of Italy. He now employed himſelf in reforming the abuſes of the ſtate, and confirming the grants formerly allowed the pope, out of gratitude for his having ſanctified his uſurpation, and declared him lawful king of Italy. After the death of Guido, Berengarius became king of Italy, without a rival, and held his kingdom during the ſpace of twenty years. In 924 he was treacherouſly aſſaſſinated at Verona. In 947, after the kingdom had undergone many changes, and ſuffered much from the incurſions and cruelties of the Hungarians, Berengarius, grandſon of the firſt king of that name, became poſſeſſed of the ſupreme power. He did not aſſume the title of king till after the death of Lotharius, which happened in 950; and in the mean time Italy was invaded by the united forces of Bavaria and Hungary. So formidable was their power, that Berengarius was obliged to purchaſe their departure with a large ſum of money, which he raiſed by a very heavy perſonal tax laid upon every individual, without diſtinction of age or ſex. In theſe efforts, Berengarius was more oppreſſive to his people than even the enemy had been: he, however, raiſed an immenſe ſum of money, ten buſhels of which he gave to the Hungarians, but kept the much larger portion for himſelf. After this he was attacked by Otho, king of Germany, who allowed him to retain his kingdom upon the hard condition of doing homage for it to the king of Germany. Berengarius did not readily ſubmit to his fate: he rebelled againſt Otho, who, determined to ſupport his authority by force of arms, brought an army into Italy, and was himſelf crowned king by the archbiſhop of Milan, and in the following year he received the crown from the hands of the pope. On this occaſion, the holy pontiff and Otho went together to the altar of St. Peter, and bound themſelves by a ſolemn oath; the pope to be always faithful to the emperor, and Otho to conſult the welfare of the church, and to reſtore to it all its patrimony granted by former emperors. Otho beſtowed rich preſents on the church, but he likewiſe ordained that the election of the popes ſhould be according to the canons: that the elected pope ſhould not be conſecrated till he had publicly promiſed, in the preſence of the emperor's commiſſaries, to obſerve every thing formerly ſpecified with regard to the rights of the emperors; that theſe commiſſaries ſhould conſtantly reſide at Rome, and make a report every year as to the manner in which juſtice was adminiſtered by the judges; and in caſe of any complaints, the commiſſaries ſhould lay them before the pope; but if he neglected to attend to them, then the imperial commiſſaries might take what ſteps they pleaſed. Thus, however much Otho might allow the pope's ſupremacy in ſpirituals, he plainly aſſumed the ſovereignty in temporals to himſelf, and thus Italy was, for upwards of 300 years, accounted a part of the German empire. This long period we ſhall of courſe almoſt entirely paſs over in this ſketch. We find, in 1215, Frederic II. acknowledged emperor, and crowned at Aix-la-Chapelle. Shortly after this he was urged by the pope to undertake an expedition into the Holy Land againſt the infidels, but he refuſed, under various pretences, obedience to the mandate of his holineſs, which cauſed the moſt decided hoſtilities between theſe great perſonages. Frederic renounced all correſpondence with the pope, and ſet his power at defiance. The pope, convinced of his error, or at leaſt of his not being able to ſupport his power againſt that of the emperor, thought proper to ſoothe him by ſubmiſſive apologies and gentle exhortations. They were accordingly reconciled. The pope ſhortly after this died; and Frederic, during the popedom of Gregory IX., undertook an expedition to the Holy Land, leaving the affairs of Italy to the management of Renaldo duke of Spoleto. The pope, hearing of his determination, prohibited his departure before he ſhould be abſolved from the cenſures of the church; but Frederic went in contempt of the church, and his ſucceſs was very complete. The ſultan ceded to him Jeruſalem, and its territory as far as Joppa. Frederic had before acquired, by marriage, the title of "king of Jeruſalem;" and now, by his moderation and great talents, he acquired the territory, to which were added Bethlehem, Nazareth, and all the country between Jeruſalem and Ptolemais, Tyre, Sidon, and the neighbouring territories: in return for which, the emperor granted the Saracens a truce for ten years; and in 1230 he returned to Italy. The reign of this prince, after his return from the Eaſt, was one continued quarrel with the popes. He was excommunicated by Gregory IX.; and in his turn he proclaimed every where that Gregory was the "great dragon," the predicted "man of ſin," the "antichriſt," &c. In 1250, Frederic, after various troubles, died. From this time, the affairs of Germany fell into the utmoſt confuſion; and Italy continued long in the ſame diſtracted ſtate in which he left it. Conrad, the ſon of Frederic, aſſumed the imperial dignity; but after his death, there were ſeveral candidates for the high honour. No emperor, however, was properly acknowledged till 1273, when Rodolph, count of Hapſburg, was unanimouſly raiſed to the vacant throne. During the interregnum which preceded the election of Rodolph, Denmark, Holland, and Hungary, entirely freed themſelves from the homage they were accuſtomed to pay to the empire; and about the ſame time, ſeveral German cities erected a municipal form of government, which continued till within theſe few years. Lubec, Cologne, Brunſwick, and Dantzick, united for their mutual defence, againſt the encroachments of the great lords, by a well-known aſſociation, called the Hanſeatic league; and theſe towns were afterwards joined by eighty others, belonging to different ſtates, which formed a kind of commercial republic. Italy alſo, during this period, aſſumed a new plan of government. From the time of Frederic II. we may date the [illegible] German power in Italy. The Florentines, the Piſans, the Genoeſe, the Luccans, &c. became independent. At the commencement of the fourteenth century, Henry VII. undertook to reſtore the imperial power in Italy. For this purpoſe a diet was held at Francfort, where ſupplies being granted for the emperor's journey, well known in hiſtory by the name of the "Roman expedition," he ſet out for Italy, which was at this period divided by the factions of the Guelphs and Gibellines, who were deſtroying one another without humanity or remorſe. Pope Clement V. had been obliged to leave Rome, which was in a ſtate of anarchy; and owing to the diviſions in that city, the holy pontiffs long took up their reſidence in France, ſo that Rome ſeemed equally loſt to the popes and the emperors. Sicily was in poſſeſſion of the houſe of Arragon, in conſequence of the maſſacre called the "Sicilian veſpers," which delivered that iſland from the tyranny of the French. Carobert, king of Hungary, diſputed the kingdom of Naples with his uncle Robert. The old league of the Italian cities no longer ſubſiſted. It had been formed with no other view than to oppoſe the emperors; and ſince they had neglected Italy, the cities were wholly employed in aggrandizing themſelves at the expence of each other. In the midſt of theſe troubles, Henry VII. appeared in Italy in 1311, and cauſed himſelf to be crowned king of Lombardy at Milan. But the Guelphs had concealed the iron crown of the Lombard kings, as if they regarded the right of reigning as attached to a circlet of metal. Henry, however, was not to be put off under ſuch a pretence: he ordered a new crown to be made, with which the royal ceremony was performed. Henry was unable to reſtore the imperial power in Italy, and his reign was terminated in a few months. From this time, the authority of the emperor in that country conſiſted, in a great meaſure, in the conveniency which the Gibellines found in oppoſing their enemies under the ſanction of his name. The power of the pope was of the ſame nature, and he was probably leſs regarded in Italy than in any other country in Chriſtendom. There was likewiſe a party who called themſelves Guelphs; but they affected this diſtinction only to keep themſelves independent of the imperialiſts. The moſt deſperate wars were carried on by the different cities againſt each other: but it would be contrary to our plan to attempt to give a detail of them; and this is the leſs neceſſary, as nothing material was effected by their valour. By degrees this martial ſpirit ſubſided; and in the year 1492, the Italians were ſo little capable of reſiſting an enemy, that Charles VIII. of France conquered the whole kingdom of Naples in ſix weeks; and he might eaſily have ſubdued the whole country, if it had not been for his own imprudence. Another attempt on Italy was made by Louis XII.; a third by Francis I.; and during the reigns of Louis XIII. and XIV., an obſtinate war was carried on between the French and the Spaniards, in which the Italian ſtates bore a conſiderable ſhare. The war concluded in 1660, with very little advantage to the French, who had never been very ſucceſsful in their Italian wars. A ſimilar want of ſucceſs attended them in the war which commenced fourſcore years afterwards: but the farther particulars relating to theſe other conteſts belong properly to the hiſtory of the different ſtates into which that country was divided.

At preſent, the whole of Italy is ſubject to the control of the French emperor, who led his victorious troops over the Alps, and made himſelf maſter of the Auſtrian dominions in Italy. The battle of Lodi decided the fate of Lombardy. Verona, Tortona, Bologna, and Urbino, quickly yielded to his arms. He even menaced imperial Rome. The pope, incapable of reſiſting his power, begged for peace, which was granted him on the humiliating conditions, that his holineſs ſhould ſurrender to the conquerors a great many pictures, and ſtatues, and a multitude of curious MSS. from the Vatican. With theſe the general was for the preſent content: he retired from Rome, perhaps, however, deſirous of ſome new cauſes to enable him to enrich his country with farther ſpoil. A pretence was ſoon given him. He had ſcarcely reached the boundaries of France, when he learned that the terms of the treaty had been wantonly broken by the ſubjects of his holineſs. In the following year, 1797, he entered Italy again, and in one battle, well conteſted, decided the fate of the eccleſiaſtical ſtate. The banners of France now waved triumphant over the patrimony of the church. The pope was obliged to ſubmit to whatever terms the conqueror ſhould dictate. He agreed to the ceſſion of Avignon, part of Venice, the cities and territories of Bologna, Ferrara, and Romagna: and to prevent the future power of the Roman pontiffs, the newly ceded territories, together with Reggio and Modena, were formed into one republic called the Ciſalpine, and afterwards the Italian republic; while the Milaneſe, and other diſtricts of Lombardy, were formed into another called the Ligurian republic. Thus the power and importance once annexed to the ſee of Rome were annihilated, and the influence of France in Italy eſtabliſhed on the ſureſt foundation. In 1801 the Italian republic was, at the deſire of Bonaparte, divided into twelve departments. We have ſeen, under the article France, in what manner Bonaparte, as well by a train of fortunate circumſtances, as by his talents, obtained the honours of a conſulſhip, in imitation of the office held in ancient Rome; and how he advanced from ſtep to ſtep, till he was proclaimed "emperor of the French," with unlimited powers. This event occurred on the 2d of December 1805, when he ſwore in the preſence of the pope (Pius VI.), whom he had brought to Paris to be the witneſs of his own humiliation, "to govern ſolely with a view to the intereſt, the happineſs, and glory of the French nation." He boldly aſſerted, in the preſence of all the principal perſonages then aſſembled, that he aſcended the throne by the unanimous wiſhes of the ſenate, the people, and the army, whoſe happineſs or miſery had conſtituted, and would for ever conſtitute the ſources of his own pleaſures and pains. "My deſcendants," ſaid he, "ſhall long preſerve this throne. In the field, they will be the firſt ſoldiers of the army, ſacrificing their lives for the defence of their country. As magiſtrates, they will never forget that contempt of the laws, and the confuſion of ſocial order, are only the reſult of the imbecility and uncertainty of princes." The ſplendour of this ſhow was introductory to a ſimilar diſplay in Italy. He had before been regarded as the chief of the Italian republic; but the name of a republic probably carried with it ideas abhorrent to his heart, and the very word grated on his ears. In the month of April 1805, he aſſumed at Milan the title of "king of Italy:" in this city he placed the iron crown on his own head, while ſenators from almoſt all the ancient ſtates were aſſembled as witneſſes of his elevation, and their own degradation. On this occaſion he related all that he had done as a conqueror and a great ſtateſman; ſaying, that the power of the French empire had nevertheleſs been ſurpaſſed by the moderation which preſided in its political tranſactions. "We had conquered," ſaid he, "Holland, three-fourths of Germany, Switzerland, all Italy; but of ſo many provinces, we have only kept what was neceſſary to preſerve us at the ſame point of conſideration and power which France has always poſſeſſed. The partition of Poland, the loſſes ſuſtained by Turkey, the conqueſt of the Indies, and almoſt all our colonies, had deſtroyed the balance of power to our diſadvantage." He next recounted all his glorious deeds, and all his generoſity with regard to Germany, Holland, and Switzerland; and adds, "The union of the Italian republic to the French would have been an advantage to our agriculture; nevertheleſs, after the ſecond conqueſt, we, at Lyons, confirmed its independence. We now do more. We proclaim the principle of the ſeparation of the crowns of France and Italy, by fixing for that ſeparation the moment it can be done, and without danger to our people of Italy. We have accepted, and will place upon our head, the iron crown of the ancient Lombards, in order to re-temper and conſolidate it; ſo that it may not be broken by the ſhocks by which it will be threatened, as long as the Mediterranean continues out of its habitual ſtate. But we do not heſitate to declare, that we will transfer that crown to one of our children, natural or adopted, the moment we are freed from alarms for that independence which we have guaranteed to the other ſtates of the Mediterranean." Upon the return of the emperor to his own dominions, it was announced to him that the Ligurian ſenate was waiting for an interview upon very important buſineſs. Accordingly, on the 25th of May, an extraordinary ſitting of the Ligurian ſenate was held, when it was decreed that Genoa, its territories, and dependencies, ſhould be annexed to the French empire. In his ſpeech on this occaſion, the emperor, having dwelt much at large on the advantage which would accrue to the continent in general, and to Genoa in particular, from this addition to his own dominions, added, "I will realize your expectations; I will unite you to my great people. I ſhall thereby acquire additional means of rendering that protection more powerful, which I have always been diſpoſed to extend to you. My people will with pleaſure receive you. They know that at all times you have been friendly to their armies; and that you have aſſiſted them with all your force, and with all your means. They find, moreover, in your territory, ports, and an increaſe of maritime power, which is neceſſary for the ſupport of their lawful rights againſt the tyrants of the ſeas.—Doge, and gentlemen of the deputation of the ſenate, and people of Genoa, return to your native country: I ſhall be there ere long, and will confirm the union which you and my people are about to form." At this meeting of the Italian legiſlature, the emperor preſented prince Eugene Beauharnois to them as his repreſentative, and viceroy of Italy; ſaying, that he himſelf would take an early opportunity of viſiting all the departments of his new kingdom, in order that he might become better acquainted with their various wants. Since that period, in conſequence of the ſucceſs attendant on the wars between France and Auſtria, which were terminated by the treaties of peace of Preſburg and Vienna, the whole Venetian territory, which pertained to Auſtria, the county of Gortz or Goritia, the city of Trieſte, Carniola, with its dependencies on the gulf of Trieſte, and all the territories lying on the right bank of the Save, from the point where that river leaves Carniola, along its courſe to where it touches the province of Boſnia, ſix diſtricts of military Croatia, Fiume, the Hungarian Littorale, Auſtrian Iſtria, together with the iſlands dependent upon the ceded territory, were added to the Italian dominions of the new emperor and king. On the 20th of March 1811, Bonaparte had a ſon born by his preſent empreſs, the daughter of the emperor of Germany. To this ſon he inſtantly gave the title of "king of Rome," and required his miniſters, and the chief perſons under his direction, to render due homage to the infant in his cradle: thus ſhewing that he meant the prince Eugene, above noticed, only as his repreſentative till one of his own children ſhould be fitted to ſway the ſceptre of the Italian kingdom. Cellarius's Anc. Geog. Univer. Hiſt. Anc. and Mod. Geographies of Pinkerton, Playfair, and Smith. Holberg's Univer. Hiſt. And Public Papers in the ſeveral volumes of the New Ann. Regiſter.

In the fifteenth century, when we firſt hear of harmony in four parts, and maſſes ſet to figurative muſic, it was for the uſe of the pope's chapel that the greateſt efforts of genius in compoſition were excited among the candidates for favour in that art, by the double certainty of having their labours liberally rewarded, and their productions well performed. And if we find that many of the compoſers of the pontifical chapel were Netherlanders, and the ſingers Spaniards, it does not neceſſarily follow that the Italians had either counterpoint, or the art of ſinging, from the Low Countries, or from Spain. The Roman college of ſingers had been eſtabliſhed and celebrated during ſo many ages, that we may as well imagine theſe foreigners went to Rome to *learn* muſic, as to *teach* it.

We know, in later times, that many of the greateſt muſicians of Europe have either had their education in Italy, or thought it as neceſſary to viſit that country as the ancient Roman philoſophers to travel into Greece, or the Grecians into Egypt. Orlando di Laſſo, Handel, Haſſe, Gluck, and J. C. Bach, went thither very early, and may be ſaid to have formed their ſtyles on the beſt models of that country. The firſt motets of Orlando that were publiſhed at Antwerp, by Tylman Suſato, 1555, were ſaid to be made "à la nouvelle compoſition d'aucuns d'Italie;" as the firſt productions of Handel, that were publiſhed in England, were ſaid to be compoſed "by an eminent *Italian* maſter;" Haſſe went very young into Italy, and was a ſcholar of Aleſſandro Scarlatti; however, his clear and graceful ſtyle more reſembled that of Vinci and Pergoleſi, his competitors in the natural, ſimple, and elegant manner of writing for the voice, than that of either Scarlatti, his maſter, or Kaiſer, his countryman, and firſt model. The late excellent compoſer, Mr. J. C. Bach, ſon and brother of two of the greateſt muſicians that ever exiſted, is allowed to have been a fine player on keyed inſtruments, before he went into Italy; but his vocal muſic is certainly more in the ſtyle of Italy, than of his native country.

If the great muſicians of antiquity, whoſe names are ſo familiar to our ears, had not likewiſe been poets, time and oblivion would long ſince have ſwept them away. But theſe having been luckily writers themſelves, took a little care of their own fame; which their brethren of after-ages gladly ſupported for the honour of the *corps*.

But ſince writing and practical muſic have become ſeparate profeſſions, the celebrity of the poor muſician dies with the vibration of his ſtrings; or if, in condeſcenſion, he be remembered by a poet or hiſtorian, it is uſually but to blazon his infirmities, and throw contempt upon his talents. The voice of acclamation, and thunder of applauſe, paſs away like vapours; and thoſe hands which were moſt active in teſtifying temporary approbation, ſuffer the fame of thoſe who charmed away their care and ſorrows in the glowing hour of innocent delight, to remain unrecorded.

If it be true that the progreſs of muſic in every country depends on the degrees of civilization and culture of other arts and ſciences among its inhabitants, and on the language which they ſpeak, the accents of which furniſh the ſkeleton and nerves of all vocal melody; great perfection cannot be expected in the muſic of Europe during the middle ages, when the Goths, Vandals, Huns, Germans, Franks, and Gauls, whoſe ideas were ſavage, and language harſh and inſolent, had ſeized on its moſt fertile provinces. All the dialects that are now ſpoken in Europe are a mixture of Celtic and Latin; and as the inhabitants of Italy preſerved the Roman language longer than thoſe of other countries remote from the ſeat of empire, more veſtiges of the Latin tongue ſtill remain in Italy than elſewhere. For though there are many terms in it that they were forced to receive from the barbarians who invaded them, yet the chief part of the language is ſtill Latin corrupted, and ſometimes ſoftened and improved. And as literature, arts, and refinements, were encouraged more early in Italy at the courts of the Roman pontiffs, than in any other country, modern muſic has thence been furniſhed with its ſcale, its counterpoint, its beſt melodies, its religious and ſecular dramas, and with the chief part of its grace and elegance. Italy, in modern times, has been to the reſt of Europe what ancient Greece was to Rome; its inhabitants have helped to civilize and poliſh their conquerors, and to enlighten the minds of thoſe whoſe ſuperior force and proweſs had frequently enſlaved them.

ITANBERA, a town of Brazil, in the government of Minas Geraes; 36 miles W. of Villa Rica.

ITANNA, or ESTENNA, a kingdom of Africa, on the Slave coaſt, ſubject to Benin.

ITAPE, a town of South America, in the province of Paraguay; 90 miles S.E. of Aſſumption.

ITAPUA, a town of South America, in the province of Paraguay, on the Parana; 170 miles S.E. of Aſſumption.

ITATA, a town of South America, in the country of Chili, on a river of the ſame name; 32 miles N.N.E. of La Conception.

ITATI, a town of South America, in the province of Buenos Ayres, on the Parana; 35 miles N.E. of Corrientes.

ITCH, in *Medicine*, a contagious diſeaſe of the ſkin, which is characterized by an eruption of numerous ſmall puſtules, more eſpecially about the fingers, wriſts, and the bending of the joints, accompanied by the moſt importunate itching, without fever.

This diſeaſe ſeems to have been included, together with the running, or moiſt tetter, under the appellation of *ulcerating pſora*, (ψωρα ἑλκώδης) of the Greeks, and conſtituted one form of the *ſcabies* of the Latin writers. In the writings of the moderns, it is ſometimes denominated *pſora*, but more frequently *ſcabies*; the term *pſora*, indeed, when uſed by the Greeks without any epithet, ſignified the ſcaly tetter, which is analogous to their *lepra*, (ſee Willan on Cutaneous Diſeaſes, Order ii. Genus 2.) and not a puſtular diſeaſe.

The eruption of ſcabies begins moſt commonly on the limbs, and eſpecially about the wriſts and fingers, in the form of minute puſtules or watery pimples, which are accompanied by a ſenſation of violent itching, which is greatly increaſed by external warmth, and therefore is particularly troubleſome ſoon after the patient gets into bed. It aſſumes, however, a conſiderable variety of forms, in different inſtances, and even in different ſtages, of the complaint, which the vulgar have noticed, and diſtinguiſhed by particular appellations. What they denominate the *rank itch*, is often ſeen early in the progreſs of the diſorder, or in mild caſes; and conſiſts of a numerous crop of pimply eruption, which ſpreads over the whole body, arms, breaſt, and lower extremities; but, on the trunk of the body eſpecially, the characteriſtic ichorous puſtule commonly appears here and there intermixed with the papulæ, and the final tendency of the eruption is to the puſtular form. In other caſes, large watery veſicles are ſeen diffuſed over the thighs, arms, hands, and region of the ſtomach; in which caſe the diſeaſe is popularly termed the *watery itch*. And not unfrequently the eruption over the arms, wriſts, and fingers, conſiſts of large, yellow puſtules, which become confluent, and form cruſts or ſcabs as the matter dries; this has been termed the *pocky itch*, not from its connection with any ſyphilitic contagion, as ſome have been led to imagine from the term; but from the reſemblance of the puſtules to thoſe of the diſtinct ſmall-pox. Some writers have mentioned a *ſcorbutic itch*, and have included the puſtular ſyphilitic eruptions under the term *itch*; but theſe eruptions, as well as the affections of the ſkin originating from the true ſcurvy, differ eſſentially from *ſcabies* in their form, and in the abſence of that inceſſant and importunate itching, which accompanies the latter. The term *ſcorbutic itch* has ſometimes been applied to the *prurigo*, it would ſeem, when it was accompanied by a particularly irritable and inflamed ſtate of the ſkin.

The pruriginous eruptions, indeed, which Dr. Willan has deſcribed as conſiſting of pimples, which do not become puſtular in general, or diſcharge any fluid, even when the tops are rubbed off, after continuing ſome time, are apt to become puſtular and contagious; that is, to degenerate into *ſcabies*, if they are long neglected, or where cleanlineſs is not ſufficiently attended to. And there is an eruption, which is not very uncommon, partaking, in its appearances, of the character of *prurigo* and *impetigo* conjoined, which is contagious in its double character, and exceedingly obſtinate. In work-houſes, moreover, a virulent ſcabies is often ſeen, which appears to be a mixture of the poiſon of *porrigo* with that of itch, and which affects the whole body, with ſcabby and itching ulcerations, that are communicated by the contagion, under the ſame form. In ſhort, it is extremely difficult to point a certain diagnoſis of the *ſcabies*, from the variety of forms under which a contagious and puſtular eruption appears, under different circumſtances. See PRURIGO.

The itch is moſt frequently communicated from one perſon to another by contagion, that is, by actual contact; as by ſleeping, ſhaking hands, &c. with a perſon affected, or by uſing the clothes, linen, &c. which had been previouſly uſed by ſuch a perſon. But in ſome caſes it ſeems to originate in individuals, who neglect or do not poſſeſs the proper means of cleanlineſs, and in others is the reſult of the converſion of the papulous diſeaſes (the lichen and prurigo of Dr. Willan's arrangement) into a puſtular diſeaſe. When the complaint is communicated by contact with the perſon or clothes of one already infected, it is doubtleſs commonly conveyed by a ſort of inoculation of the ichorous or purulent matter, diſcharged from the puſtules. Some, however, have attributed the diſeaſe itſelf, as well as the ready propagation of it, to the exiſtence of certain minute inſects, which breed in the furrows of the cuticle, and which are conveyed from one perſon to another by ſuch intercourſe as we have juſt mentioned. Bonomo, an Italian phyſician, was one of the firſt to deſcribe this inſect, and his account was made known in England by Dr. Mead. (See Philoſ. Tranſ. vol. xxiii.) It has been ſince called the *acarus ſcabiei*, and has been particularly deſcribed and figured by Degeer (Hiſt. des Inſectes), and others. Linnæus conſidered it the ſame with the acarus or mite, which breeds in flour; but Degeer has ſhewn this to be a miſtake. Theſe inſects, which we confeſs we have never been able to detect in any caſe of ſcabies, are ſaid to be found, not in the large puſtules, but in the recent watery puſtules, or ſtill more commonly in the furrows of the cuticle, near them, on the hands and fingers.

Cure.—A great variety of remedies have been employed at different times for the cure of this filthy complaint; and in general, indeed, it is not very difficult of cure, although the remedy is alſo filthy like the diſeaſe. Sulphur, both taken internally, in combination with ſome neutral or alkaline ſalt, and applied externally over the parts affected, in the form of an ointment, is found to be the moſt certain and efficacious remedy. The white hellebore, applied either in an ointment, or in a ſtrong decoction as a lotion, has conſiderable influence over the diſeaſe; and ſome of the preparations of mercury, ſuch as the white precipitate, the oxymuriate, or corroſive ſublimate, &c. as well as the muriate of ammonia, potaſh in a ſtate of a deliqueſcence, &c. are alſo occaſionally reſorted to, in various combinations, with ſucceſs. A number of other medicines, both external and internal, are recommended by the older writers, eſpecially the juices and decoctions of ſeveral roots and plants; but it ſeems altogether unneceſſary to enumerate them, ſince recent experience has decided upon the ſuperior efficacy of the remedies juſt mentioned. See Turner on Dif. of the Skin. Calliſen. Syſt. Chir. Hodeira. § 824. Sauvages, Noſol. Meth. Claſs x. Gen. 28.

Itch *Animal*, a creature ſaid to be found in the puſtules of the itch; it is a ſpecies of acarus.

ITCHAPOUR, in *Geography*, a town of Hindooſtan, in the circar of Ellichpour; 48 miles S.S.W. of Ellichpour. N. lat. 20° 28′. E. long. 77° 38′.—Alſo, a town of Hindooſtan, in the circar of Cicacole; 30 miles S.S.W. of Ganjam.

ITCHAUR, a town of Hindooſtan, in the circar of Hindia; 30 miles N. of Hindia.

ITCHE, a town of Thibet; 95 miles S.W. of Chatcheou.

ITCHING River, in Hampſhire, is navigable for barges up to Wincheſter city, of which an account has been given in our article Canal: ſince which, there have been attempts, and one is now making, for obtaining an act for further improving this navigation. About 1802, a bridge was built over this river at Northam. At Wood mills, on this river, ſhips' blocks are manufactured by machinery, but in a manner far leſs complete and ingenious than the block machines by Mr. Brunell, which are erected in the dock-yard at Portſmouth, of which we intend to give ſome account under our article *Block* Machinery.

ITCHORSKA, a town of Ruſſia, in the government of Irkutſk, on the Lena; 80 miles N.E. of Kirenſk.

ITEA, in *Botany*. Ιτεα of the ancient Greeks is a general appellation for willows or ſallows, as appears from Theophraſtus and Dioſcorides. The word is derived from παρα το ιεναι, alluding to their quick growth, or early germination.—Linnæus applied the name to this North American genus from its willow-like aſpect.—Linn. Gen. 109. Schreb. 150. Willd. Sp. Pl. v. 1. 1146. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. 37. Juſſ. 159. Lamarck Dict. v. 3. 314. Illuſtr. t. 147. (Cyrilla; Linn. Mant. 50. Syſt. Veg. ed. 14. 241. Schreb. 150.) Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, erect, very ſmall, permanent, divided into five acute, coloured ſegments. *Cor.* Petals five, lanceolate, long, inſerted into the calyx. *Stam.* Filaments five, awl-ſhaped, erect, the length of the corolla, inſerted into the calyx; anthers roundiſh, incumbent. *Piſt.* Germen ſuperior, ovate; ſtyle cylindrical, permanent, as long as the ſtamens; ſtigma obtuſe. *Peric.* Capſule ovate, much longer than the calyx, terminated by the ſtyle, of two cells, and two valves with inflexed edges, gaping at the top. *Seeds* numerous, very ſmall, oblong, ſhining.

Eſſ. Ch. Petals long, inſerted into the calyx. Capſule of one cell, and two valves.

Obſ. L'Heretier has the honour of having firſt declared the *Itea* and *Cyrilla* of Linnæus to be one and the ſame genus, from the conformity of the flower, and two-celled fruit of each.

1. I. *virginica*. Linn. Sp. Pl. 289. Trew. Ehret. 55. t. 98.—"Leaves ovate, acute, ſerrated."—A native of North America, flowering from June to Auguſt.—This *ſhrub* riſes to the height of five or ſix feet. Its *ſtem* is branched all the way up. *Leaves* ſlightly ſerrated, reflexed, light green. *Flowers* white or yellowiſh, compoſed of numerous ſpikes three or four inches long.—Linnæus remarks that this ſpecies is very ſimilar in appearance to *Prunus Padus*, the Bird-cherry.

2. I. *Cyrilla*. Willd. n. 2. L'Herit. Stirp. faſc. 6. 137. t. 66. (Cyrilla racemiflora; Linn. Mant. 50. Jacq. Ic. Rar. 1. t. 47.)—"Leaves lanceolate, entire, membranaceous."—A native of Carolina. It flowers in July and Auguſt.—*Root* perennial. *Stem* ſparingly branched, round, aſh-coloured. *Leaves* alternate, bluntiſh, rather undulated; their foot-ſtalks reddiſh. *Cluſters* numerous, lateral, from four to ſix inches long. *Flowers* ſcattered, white; anthers pale-violet coloured; germen whitiſh.

Itea, in *Gardening*, contains plants of the hardy, deciduous, ſhrubby kinds, of which the ſpecies moſtly cultivated are, the Virginian itea (I. virginica); and the entire-leaved itea (I. cyrilla).

Method of Culture.—The firſt ſort is capable of being increaſed by layers, which ſhould be laid down in the autumn, when they will put out roots ſo as to be fit to take off by the following autumn, when they may be removed into the nurſery, or the places where they are to grow. It does not ſucceed well on dry gravelly ſoils.

It is alſo capable of being raiſed from ſeed, by ſowing it in the ſpring, as ſoon as procured from abroad.

The ſecond ſpecies may be increaſed by layers or cuttings, planted in pots of good mould in the ſpring; in the latter caſe, placing them in a mild hot-bed, till they have ſtricken root, afterwards removing them into ſeparate pots, placing them in airy ſituations in the green-houſe or other proper place.

Plants of the firſt kind are very ornamental in the borders and clumps, and thoſe of the latter among green-houſe collections, or thoſe in other protected places.

ITENG, in *Geography*, a ſmall iſland in the Eaſt Indian ſea. S. lat. 6° 42′. E. long. 132° 15′.

ITERATION. See Reiteration.

ITERI, in *Geography*, a town of the iſland of Sardinia.

ITFU, a town of Egypt; 8 miles S. of Tahta.

ITHACA, a town of New York, at the ſouthern extremity of lake Cayuga; 30 miles S. of Cayuga. N. lat. 42° 27′. W. long. 76° 33′.

Ithaca, in *Ancient Geography*, one of the Greek iſlands, ſituated in the Ionian ſea, between Dulichium and Capalenia, famous for being the birth-place of Ulyſſes, the ſon of Laertes. It had the advantage of a town and a good port: it is now called "Theaki," and its port "Vahti." Its circuit is reckoned about 40 miles. Some ruins ſtill remain, which tradition reports to have been part of the palace of Penelope.

ITHCYPHOS, in *Surgery*, curved or deformed in the back.

ITHOME, in *Ancient Geography*, a town of Meſſenia, north of Meſſene, ſo called from the mountain on which it was erected and well fortified, being encompaſſed with a ſtone wall. In it was a ſtatue of Jupiter the "Saviour," and alſo a fountain called Arſinoe, which was ſupplied with water from another fountain called Clepſydra. Neptune and Venus had each of them a temple in this place; and the mother of the gods had a ſuperb ſtatue of Parian marble. This town contained alſo a temple dedicated to Meſſené, daughter of Triopas, whoſe ſtatue was formed partly of gold and partly of the marble of Paros. It had likewiſe a temple, in which were depoſited and preſerved the victims appropriated to the ſacrifices. Beſides, it was adorned with all the ſtatues of the gods which were worſhipped in Greece. It had a theatre which had been a temple dedicated to Serapis and Iſis. The citadel was conſtructed on the ſummit of the mountain, and at the gate by which they paſſed to Megalopolis was a ſtatue of Mercury.

Jupiter was worſhipped in this place under the appellation of "Ithomatus" by the people of Meſſenia: and as they pretended that he had been educated in their country, they appropriated to him a peculiar worſhip; and while the feſtival, called "Ithomæa" laſted, they were accuſtomed to carry water during the whole day from the fountain Clepſydra into his temple. Games accompanied this feſtival, and alſo trials of ſkill on various inſtruments of muſic: Pauſan. in Meſſen.

ITHYNTERION, ἰθυντήριον, in *Antiquity*, a ſtaff of laurel, which prophets uſually carried in their hands, otherwiſe called *ſceptron.*

ITHYSCOLIOS, in *Surgery*, an oblique curvature of the ſpine.

ITINERANT JUDGES, or *Juſtices*, ſuch as were formerly ſent with commiſſions into divers counties, to hear chiefly thoſe cauſes called *pleas of the crown:* the ſame with what are otherwiſe called *juſtices in eyre.* See JUSTICE.

ITINERARIUM, in *Surgery*, a name given by Hildanus, and many other writers, to a ſtaff uſed in the operation of cutting for the ſtone.

ITINERARY, the deſcription a traveller gives of the courſe of his journey, and of the curioſities, &c. he obſerved therein.

The Itinerary of Antonine ſhews all the grand Roman roads in the empire, and all the ſtations of the Roman army. It was drawn up by order of the emperor Antoninus Pius; but is now very defective, having ſuffered much under the hands of the copyiſts and editors.

ITINERARY *Column.* See COLUMN.

ITING, in *Ornithology.* See GRACULA *Calva.*

ITIOBARA BAY, in *Geography*, a bay on the coaſt of Brazil. S. lat. 6° 20′. W. long. 37° 46′.

ITIUM PROMONTORIUM, in *Ancient Geography*, a promontory of Gaul, mentioned by Ptolemy, and ſuppoſed to be at the mouth of the Somme, in France, and extending towards the north. According to D'Anville it is Griſsneſs.

ITIUS PORTUS. See ICCIUS *Portus.*

ITKARINSKOI, in *Geography*, a town of Ruſſia, in the government of Kolivan; 156 miles E.N.E. of Kolivan. N. lat. 55° 36′. E. long 85° 44′.

ITONA, in *Ancient Geography*, a town of Epirus.—Alſo, a town of Italy.—Alſo, a town of Aſia Minor, in Lydia.—Alſo, the name of two places, one in Bœotia, the other in Lydia.

ITORUM URBS, a town of Italy, on the route from Otricoli to Rimini, near the mountains; mentioned by Strabo.

ITRABO, in *Geography*, a town of Spain, in the province of Granada; 10 miles W.N.W. of Motril.

ITRI, a town of Naples, in the province of Lavora; 3 miles S.E. of Fondi.

ITSJA, a town of Japan, in the iſland of Ximo; 10 miles N. of Taiſero.

ITTENDAL, a town of Sweden, in the province of Helſingland; 15 miles N. of Hudwickſwal.

ITTERGAU, a fertile diſtrict of Upper Heſſe, watered by the Itter, which runs into the Eder, two miles S. W. of Vohle.

ITTER THAL, ITTER-EN-VAL, or *Bergſtadt*, a town of Upper Heſſe; 24 miles W. of Caſſel.

ITTIGIUS, THOMAS, in *Biography*, who flouriſhed in the ſeventeenth and eighteenth centuries, was born at Leipſic about the year 1654. Here he purſued his ſtudies, and was afterwards appointed aſſeſſor of the faculty of philoſophy at the ſame place. Being admitted to the miniſtry, he diſcharged the duties of that office in different churches in that city. In 1686, he was admitted to the degree of doctor of divinity, and in the following year he was appointed firſt profeſſor extraordinary in that faculty, and then profeſſor in ordinary. He took a conſiderable ſhare in publiſhing the "Leipſic Acts," and beſides other employments, filled the poſt of ſuperintendant of the eccleſiaſtical diſtrict of that city. He died in 1710: and was author of "A Treatiſe on Burning Mountains;" "Diſſertatio de Hæreſiarchis Ævi Apoſtolici, eique proximi;" "Prolegomena ad Joſephi Opera," and many other works, which were highly eſteemed by his contemporaries. Lardner, in his ſeventh vol. ſpeaks of him as the very learned Ittigius. The ſame author refers to his opinion in other places. Moreri. Lardner.

ITU, in *Geography*, a town of South America, in the province of Buenos Ayres, on the Parana; 130 miles E. of Corrientes.

ITUCI, in *Ancient Geography*, a town of Hiſpania, in Bœtica, a little ſouth of Caſtulo, and north of Eliberis; called by Pliny "Virtus Julia."

ITUERO, in *Geography*, a town of Spain, in the province of Leon; 13 miles S.S.W. of Civdad Rodrigo.

ITUNA, in *Ancient Geography*, an eſtuary of Britain, which is unqueſtionably the Solway Firth, which now divides England from Scotland on the weſt ſide.

ITUREA, a provice of Aſia, ſo called from Itur, the ſon of Iſhmael, ſometimes erroneouſly called Jetur. It was ſituated on the other ſide of Jordan, on the N. ſide of the half-tribe of Manaſſeh, between that and the territories of Damaſcus; ſo that it made one part of Cœleſyria, and lay on the ſide of Judæa, as Idumæa lay on the other. The Itureans were famous for drawing the bow, but they were a fierce people. Iturea was invaded by Ariſtobulus, who ſucceeded his father Hyrcan; but being taken ill in the midſt of his ſucceſſes, he was under a neceſſity of being brought back to Jeruſalem, and to leave his brother to complete the conqueſt of that province; an achievement which he ſoon accompliſhed, cauſing all the Itureans, either to be circumciſed and incorporated with the Jews, or elſe to depart into ſome other country.

ITURISSA, a town of Hiſpania, in the country of the Vaſcones. Ptol. In the Itinerary of Antonine it is placed 18 miles from the Pyrenees.

ITWA, in *Geography*, a town of Bohemia, in the circle of Pilſen; 3 miles N.W. of Teuſing.

ITYCA, in *Ancient Geography*, a town of Africa, in Lybia, which was a colony of Tyrians.

ITYPHALLOPHORI, in *Ancient Mythology*, attendants on the orgies of Bacchus, who accompanied the Phallophori, habited like fawns, counterfeiting perſons drunk, and ſinging, in honour of Bacchus, ſongs ſuitable to their functions. See ORGIES.

ITYS, in *Ancient Geography*, one of the rivers of Britain, which runs into the ſea oppoſite to the iſle of Skye.

ITZEHOE, in *Geography*, a town of the duchy of Holſtein. This town has a very ancient origin: it is named from a fortreſs built in the beginning of the ninth century by order of Charles the Great, iſſued in 809, to repel the incurſions of the Danes into Germany. This fortreſs was called Eſſeho, or Iſſeho. In proceſs of time it was ſurrounded by a number of houſes, which, about the middle of the 13th century, obtained the privileges of a town. It has ſince been ſeveral times deſtroyed; but is now a ſmall, agreeable, and well built town, partly ſituated on the river Stöer, which runs into the Elbe, and has been erroneouſly mentioned by ſome travellers as a canal cut from that river. It is diſtant from Hamburgh 47 miles, and 12 from Gluckſtadt. The church, which is in the market-place, is very ſmall, but the ſteeple is high, of a particularly light architecture: it ſtands on four ſmall iron pillars, which, at a diſtance, are hardly perceivable. N. lat. 53° 57′. E. long. 9° 35′.

IVA, in *Botany*, a name apparently of barbarous origin, firſt applied to a ſpecies of *Teucrium* or *Ajuga*. It does not appear why Linnæus appropriated it to the preſent genus.—Linn. Gen. 490. Schreb. 637. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 346. Juſſ. 190. Lamarck Dict. v. 3. 315. Illuſtr. t. 766. Gærtn. t. 164. (Tarchonanthus; Vaill. Act. 1719. f. 16, 17.)—Claſs and order, *Monœcia Pentandria*. Nat. Ord. *Compoſitæ Nucamentaceæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* roundiſh, of about five ſubovate, obtuſe, nearly equal, permanent leaves, containing many florets. *Cor. Compound* convex, having numerous male florets in the diſk, and five female ones in the circumference; that of each of the males monopetalous, funnel-ſhaped, five-toothed, the length of the calyx; of the females wanting. *Stam.* Filaments five, ſetaceous, the length of the floret; anthers erect, approximated. *Piſt.* Germen oblong, the length of the calyx; ſtyles two, capillary, long; ſtigmas acute. *Peric.* none, except the unchanged calyx. *Seeds* ſolitary, naked, as long as the calyx, thicker about the upper part, obtuſe. *Recept.* beſet with linear ſcales.

Eſſ. Ch. Male, Common calyx of three or five leaves. Florets of the diſk monopetalous, five-cleft. Female, Corolla wanting. Styles two. Seeds naked, obtuſe.

1. *I. annua.* Linn. Sp. Pl. 1402. Schmid. Ic. 59. t. 16. "Leaves lanceolate, ovate. Stem herbaceous."—A native of South America.—This *annual* riſes to the height of five or ſix feet. *Root* fibrous, branching. *Stem* jointed, furrowed, red, hairy; pairs of oppoſite branches formed at each joint. *Leaves* oppoſite, on foot-ſtalks, ovate and pointed, veined, reddiſh above, and green underneath. *Cluſters* axillary and terminal, blueiſh, or of the ſame ruſty colour with the ſtem, interſperſed with long, pointed, ſerrated bracteas.

2. *I. fruteſcens.* Linn. Sp. Pl. 1402. (Elichryſo affinis peruvania fruteſcens; Pluk. Phyt. t. 27. f. 1.)—"Leaves lanceolate. Stem ſhrubby."—Found in Virginia and Peru. It flowers in Auguſt.—*Root* perennial. *Branches* woody, ſlender, eight or ten feet long. *Leaves* ſerrated; the branches terminated by cluſters of pale purple flowers.

Iva, in *Gardening*, compriſes plants of the hardy, deciduous, ſhrubby, herbaceous, annual kinds, of which the ſpecies commonly grown are, the annual iva (I. annua), and the ſhrubby iva, or baſtard Jeſuit's bark-tree (I. fruteſcens.)

Method of Culture.—The plants of the firſt ſort are raiſed by ſowing the ſeeds on a moderate hot-bed in the ſpring, and when they are fit to remove, placing them in another hot-bed, treating them as the leſs tender annual ſorts.

But in the ſecond ſort, the young branches ſhould be laid down in the ſpring, when they will put out roots in about ſix months; or cuttings may be planted in a ſhady border in May, and when they have taken root, removed, with earth about their roots, to the places where they are to grow. The plants ſucceed beſt in a dry ſoil, and warm ſheltered ſituation.

Plants of the firſt ſort afford ornament among the leſs tender annuals, and thoſe of the latter in the warm borders and clumps in ſhrubberies and pleaſure ground

IVAFUNE, in *Geography*, a town of Japan, in the iſland of Niphon; 30 miles S.S.E. of Nigata.

IVAHAH is the name of one of the canoes or boats uſed by the iſlanders of the South ſea, for ſhort excurſions to ſea: it is wall-ſided and flat-bottomed. See Boat.

Ivan I., Vassilievitch, John Basilowitz, in *Biography*, czar of Ruſſia, was born in 1438, and ſucceeded to the throne in 1462. At this period Ruſſia was divided into a number of petty principalities: ſome of them were ſubject to the czar or great duke, and all, together with him, tributary to the Tartars, who aſſumed a ſuperiority over that prince. The following is given as an inſtance of the ſervitude of the great duke. It is recorded by Cromer the Poliſh hiſtorian, and quoted by Coxe in his travels: "Whenever the Tartar ambaſſadors were ſent to Moſcow to collect tribute, the great duke uſed to meet them, and offer, as a mark of his reſpect, a cup of mare's milk; and if a drop chanced to fall upon the mane of the horſe on which the Tartar ambaſſador was ſitting, he would himſelf lick it up. When they reached the hall of audience, the ambaſſadors read the khan's letter ſeated upon a carpet of the choiceſt furs, while the great duke with his nobles knelt, and liſtened in reſpectful ſilence." Ivan, who may be juſtly eſteemed the founder of Ruſſian greatneſs, was a man of gigantic ſtature, and of correſponding reſolution and vigour, accompanied with the ferocity of a barbarian deſpot. In the courſe, however, of a proſperous reign of above 40 years, he gave a new aſpect to the Ruſſian affairs: he annexed to his dominions ſeveral neighbouring principal duchies, ſubdued Novogorod, and reſcued his country from the Tartar yoke. He had no ſooner delivered Ruſſia from this dependence, than his alliance was courted by many European ſovereigns, and during his reign, for the firſt time, the emperor of Germany, the pope, the grand ſignior, the kings of Poland and Denmark, and the republic of Venice, felt it their intereſt to ſend ambaſſadors to the Ruſſian court. The talents of Ivan were not confined to military affairs. Ruſſia was indebted to him for the improvement of her commerce, and for opening a more ready communication with European nations. Under his auſpices, the knowledge of gunpowder, and the art of caſting cannon were firſt brought into Ruſſia by Ariſtotle of Bologna: he employed the ſame artiſt, and ſome other foreigners, to re-coin Ruſſian money, which had hitherto been disfigured by Tartar inſcriptions: he engaged, at a vaſt expence, Italian artiſts to encloſe the citadels of Moſcow and Novogorod, with walls of brick, and to erect ſeveral churches and other public ſtructures with the ſame materials. For his various ſervices he obtained the title of *Great*. It ſhould be obſerved, that the manners of Ivan were ſoftened and poliſhed in ſome degree by the example of his ſecond wife Sophia, a Grecian princeſs, daughter of Thomas Palæologus, a lady of conſummate beauty and winning addreſs, who, to all the ſofter graces of her ſex, added a vigorous and manly ſpirit, and who, while ſhe infuſed into her huſband a taſte for the arts of peace, animated him to thoſe glorious enterpriſes which occaſioned the aggrandiſement of his country. He is repreſented as being ſtern and unfeeling, given to ebriety, though he puniſhed it ſeverely in others, and an object of dread to all who approached him. He died in 1505, in the 67th year of his age, and the 43d of his reign. On each ſide of his remains were depoſited thoſe of his father, Vaſſili Vaſſilievitch, and of his ſon, Vaſſili Ivanovitch, who ſucceeded him on his throne, and expired in 1533. Coxe's Travels, vol. ii

Ivan II., Vassilievitch, ſucceeded his father Ivanovitch in the year 1530. Being only three years of age, he was left under the care and ſuperintendance of guardians, who faithfully performed the duty committed to them, and defeated the plots of the young prince's uncles, who were deſirous of depriving him of his crown. At the age of 19 he ſent a ſplendid embaſſy to the emperor Charles V. the chief purpoſe of which was to obtain from Germany proper perſons to aſſiſt him in the civilization of his ſubjects, and in introducing arts and manufactures. More than 300 artiſans, of all profeſſions, actually arrived at Lubec in their way to Moſcow, but were prevented from proceeding on their journey by the intrigues of the inhabitants of that town. Ivan II. raiſed the ſuperſtructure of the Ruſſian grandeur, of which his grandfather had laid the foundation. He inſtituted a ſtanding army, trained his ſoldiers to the uſe of fire-arms, and accuſtomed them to a more regular diſcipline. By means of this formidable body, he extended his dominions on all ſides, conquered the kingdoms of Kaſan and Aſtracan, and rendered the Ruſſian name reſpectable to the diſtant powers of Europe. He gave to his ſubjects the firſt code of written laws; he introduced printing into Ruſſia; he promoted commerce, and regulated all the duties connected with it. While involved in a war with the Poles, a domeſtic conſpiracy, in 1566, occaſioned by his tyranny, threatened to deprive him of his crown. Such was the danger, that he thought it beſt to make a feigned abdication. This produced the propoſed effect of awakening the dormant loyalty of the people; but as ſoon as he had reſumed the reins of government, he put to death the leaders of the conſpiracy, and ſecured himſelf againſt any future rebellion, by the inſtitution of a body of guards drawn from the remote provinces, and attached ſolely to himſelf. Theſe he augmented, till at length they proved ready inſtruments of deſpotiſm. He entered into a friendly intercourſe with queen Elizabeth of England, to whom he propoſed an alliance offenſive and defenſive. Though the queen did not agree to his propoſal in its full extent, yet a treaty was made, which was the commencement of the intercourſe which has ſince ſubſiſted between the two nations. In an invaſion of Ruſſia by the Poles, the city of Novogorod incurred the ſuſpicion of having, by its principal inhabitants, held a correſpondence with the king of Poland. This defection was puniſhed in the moſt barbarous manner by the czar, who, in the courſe of a few weeks, adjudged ſeveral thouſand perſons to death. In 1571, after Ruſſia had been deſolated by the plague, the Crim Tartars, inſtigated by the Poles, made an irruption into the ſouthern provinces, and advancing towards Moſcow, entirely defeated the Ruſſian army, which made a ſtand within 18 leagues of the capital. Ivan, upon the news, ſhut himſelf up in a fortified cloiſter, with his two ſons, and moſt valuable effects, and by this cowardly deſertion, allowed the Tartars to enter Moſcow, which they plundered and burnt, with a vaſt deſtruction of the inhabitants. The czar's moſt formidable enemy was Stephen Battori, king of Poland, who, with the king of Sweden, declared war againſt Ruſſia in 1579, took Narva and Riga, and became maſters of the whole of Livonia. The Ruſſians murmured at his conduct, and ſome of the nobles ventured to make remonſtrances againſt his ſuffering foreign enemies to ravage the country, and requeſted that he would permit his eldeſt ſon to appear at the head of the army. The czar, ſuſpecting that the prince had urged the nobles to this ſtep, reprimanded him in very ſevere terms; and he attempting to juſtify himſelf, the father's anger was rouſed to ſuch a pitch, that he gave him a violent blow with a ſtaff tipped with iron, which laid him at his feet, and which in four days proved fatal. The ſavage monarch, who did not probably intend his ſon's death, paſſed from the extreme of anger to that of ſorrow: he refuſed to take food or change his dreſs for ſeveral days, and endeavoured to expiate the deed by a magnificent funeral. An unſucceſsful attempt to chaſtiſe the Tartars, who had made a new incurſion into the Ruſſian territories, was the laſt act of this reign. He negociated with them and returned to Moſcow, when the approach of his own death awakened in him a deſire of conferring benefits on his people. He now endeavoured to correct abuſes introduced by his long wars, performed many acts of clemency, enjoined his ſucceſſor to liberate priſoners, repeal taxes, and redreſs the injuries which his brutality had inflicted. He expired in 1584, in the 54th year of his age. He has been reckoned among the great monarchs of his country, on account of his ſpirited and ſucceſsful attempts to free it from a foreign yoke, and to introduce arts and civilization. He left two ſons, of whom Feodor or Theodore ſucceeded him.

JUAN, GEORGE, in *Biography*. See the article DEGREE for an account of this naval commander, eminent for his mathematical knowledge and ſkill in practical aſtronomy.

JUAN, *St.* in *Geography*, one of the Cape Verde iſlands. See BRAVA.—Alſo, the capital of California. N. lat. 26° 25'. W. long. 114° 9'.—Alſo, a town of Mexico, in New Biſcay; 75 miles S.S.W. of Paral.—Alſo, a town of South America, in the province of Panama, between Panama and Porto-Bello.—Alſo, a ſea-port town of Mexico, in the province of Nicaragua; 30 miles S.E. of Leon. N. lat. 12° 10'. W. long. 87° 38'.—Alſo, a town in Eaſt Florida; 12 miles N. of St. Mark.—Alſo, a ſmall iſland in the North Pacific ocean, near the coaſt of New Albion, between the iſlands of St. Clemente and St. Diego.—Alſo, a town on the W. coaſt of the iſland of Luçon. N. lat. 17° 12'. E. long. 120° 48'.—Alſo, a town of South America, in the province of Moxes; 70 miles E N.E. of Trinidad. —Alſo, a town of Paraguay; 270 miles S.S.E. of Aſſumption.—Alſo, a river of New Mexico, which runs into the gulf of California, N. lat. 29° 10'.—Alſo, a river of Spaniſh North America, in the province of Nicaragua, which forms an outlet for the lake of Nicaragua to the gulf of Mexico. It has been propoſed to make uſe of this river in order to open a communication between the Atlantic and Pacific ocean. It is ſaid to be navigated by the Indians through its whole courſe, and was reported in the reign of Charles V. to be as conſiderable as the Guadalquivir at Seville. The length of the river St. Juan is by the lateſt Engliſh maps about 100 miles: and it is navigated by large flat-bottomed boats and canoes, laden with tallow and other effects, which they carry to Porto-Bello, at the diſtance of 80 leagues; but they are obliged to unload at three places, probably rapids, where canals would be required. At one of theſe, the caſtle of our lady, called by the Engliſh the fort St. Juan, is placed on a rock, and though ſmall, ſtrong enough to protect the entrance. It has 36 cannons and a battery; level with the water is a platform, and towards the land it is defended by a ditch and rampart, reaching to the river. The uſual garriſon is 100 men, beſides 16 of artillery, 40 muſqueteers, and 20 militia; which laſt manage the barks, two being placed every night up and down the river. There are 18 ſlaves, male and female, for the ſervice of the garriſon, which is ſupplied with proviſions, fleſh, fowls, garden ſtuff, maize, and other articles, from the city of Granada, at the diſtance of 60 leagues; and there are always proviſions for ſix months. But the climate is unhealthy, as it rains almoſt perpetually, and a recruit of 50 men from the capital, Guatimala, is neceſſary to ſupply the places of thoſe who die. This fortreſs is regarded as the key of New Spain and Peru; and by ſeizing it, and the port of Realejo, an enemy would become maſter of both oceans. Such is the account of Alcedo, cited by Pinkerton in the 3d volume of his Geography, to which we refer for ſome further particulars relating to the projected paſſage by the lake of Nicaragua between the two fore-mentioned oceans..—Alſo, a town of South America, in the Audience of Quito; 15 miles N.W. of St. Joachim de Omaguas.—Alſo, a river of Popayan, which runs into the Pacific ocean, N. lat. 3° 32′.

Juan *Battiſta, St.*, a town of South America, in the province of Chiquitos; 250 miles E.S.E. of Santa Cruz de la Sierra la Nueva.—Alſo, an iſland in the Pacific ocean, diſcovered by Quiros in 1606. S. lat. 26°. W. long. 149°.

Juan *de Buenaviſta*, a town of the iſland of Cuba, on the N. coaſt. N. lat. 22° 2′. W. long. 77° 57′.

Juan *Capiſtrano, St.*, a Spaniſh ſettlement and miſſion in New Albion, formed in 1776; ſituated in a ſmall cove on the Pacific ocean.

Juan *de Cinaloa, St.* See Cinaloa.

Juan *de Dios, St.*, a town of New Navarre; 240 miles W. of Caſa Grande.

Juan *Fernandes.* See Fernandes.

Juan *de la Frontera*, or *de la Cordillera*, a town of Chili; 120 miles N.N.E. of St. Yago. In its neighbourhood are gold mines. S. lat. 33° 25′. W. long. 68° 55′.—Alſo, a diſtrict of South America, lying to the eaſt of the Andes, with a town of the ſame name; called alſo Chacapoyas.—Alſo, a town of Peru, and capital of a juriſdiction in the dioceſe of Truxillo. S. lat. 6° 12. W. long. 77° 28′.

Juan *de Fuca, Straits of*, a large bay or gulf of the North Pacific ocean, on the W. coaſt of North America. In 1792 captain Vancouver gave it the name of the gulf of *Georgia*, which ſee. Its entrance lies in N. lat. 48° 25′. W. long. 122° 55′.

Juan *de Goava, St.*, a town of the iſland of Hiſpaniola; 80 miles N.W. of St. Domingo.

Juan *de Nova*, two ſmall iſlands in the Indian ſea. S. lat. 10° 20′. E. long. 52° 45′.

Juan *de los Llanos, St.*, or *San*, a province of South America, in New Granada, which forms a conſiderable diſtrict, if it be extended as far as the Orinoco; but as the capital town is on the weſtern ſkirts, the extenſion given by La Cruz ſeems very arbitrary, there being no Spaniſh ſettlement in that direction. This territory conſiſts of prodigious plains, extending for 2 or 300 leagues. The town was founded in 1555, and was formerly celebrated for gold mines, which have now declined; and the inhabitants ſcarcely exceed 50; 50 miles E.S.E. of Santa Fé de Bogota. N. lat. 3°. W. long. 73° 26′.

Juan *del Oro, St.*, or *Caravaya*, a town of Peru, and capital of a juriſdiction, in the viceroyalty of Buenos Ayres, and dioceſe of Cuſco; 150 miles S.E. of Cuſco. N. lat. 14° 40.′ W. long. 69° 36′.

Juan *de Paſto, St.* See Pasto.

Juan *de Porto Rico, St.*, a town and capital of the iſland of Porto Rico, ſituated on a peninſula in the N. coaſt of the iſland, having a good harbour, defended by a citadel and caſtle; populous and well built, the ſee of a biſhop and reſidence of the governor. The town was founded in the year 1514; but in 1594, when it was in a flouriſhing ſtate, it was attacked by ſir Francis Drake, who deſtroyed all the ſhips in the harbour, but could proceed no farther. In 1597 it was taken and plundered by the earl of Cumberland. N. lat. 18° 30′. W. long. 66° 20′.

Juan *del Rey, St.*, a town of Mexico, in the province of Guaxaca; 25 miles N. of Guaxaca.

Juan *Rio*, a town of the iſland of Cuba; 26 miles E.S.E. of Spiritu Santo.

Juan *d'Ulua, St.*, a ſmall iſland in the gulf of Mexico, near the coaſt of Tlaſcala, at the mouth of the river Vera Cruz. On this little iſland is a fortreſs to defend the entrance into the harbour of Vera Cruz.

IVANGOROD, a town of Ruſſia, in the government of Peterſburg, on the Pliuſa, near the Baltic, oppoſite Narva, built by Ivan Baſilowitz; ſurrounded by a treble wall, and defended by a number of ſmall towers: 52 miles S.W. of Peterſburg. N lat. 59° 16′. E. long. 28° 14′.

IVANITS, a town of Croatia, on the river Lonia; 42 miles N.E. of Carlſtadt. N. lat. 46°. E. long. 16° 44′.

JUANNA. See Hinzuan.

IVAPECANGA, in *Botany*, a name given by ſome authors to the climbing plant, of which the ſarſaparilla, uſed in medicine, is the root.

JUAR, in *Geography*, a town of Hindooſtan, in the ſubah of Delhi; 17 miles S. of Secundara.

JUBA I., in *Biography*, king of Numidia, the ſon of Hiempſal, a deſcendant of Maſſiniſſa, favoured the cauſe of Pompey againſt Julius Cæſar. He defeated Curio, one of Cæſar's lieutenants, in Africa, who periſhed in the action; and after the battle of Pharſalia he united his forces to thoſe of Scipio. They were joined by Cato, who repreſſed the pride of Juba, by preventing him taking place above Scipio. He was conquered in a battle at Thapſus, and was totally abandoned by his ſubjects. Seeing that all was loſt, he killed himſelf, as did Petreius, who had ſhared his good fortune and his adverſity. His kingdom became a Roman province, of which Salluſt was the firſt governor.

Juba II. king of Mauritania, ſon of the preceding, being very young at the time of his father's death, was led as a captive in Cæſar's triumph. The conqueror requited him for this act of humiliation by affording him the advantages of an excellent education, in conſequence of which he became one of the moſt learned men of his time, and attained a conſpicuous place as an author, by which he attained to more glory than he could have derived from the inheritance of a kingdom. He gained the hearts of the Romans by the courteouſneſs of his manners, and Auguſtus rewarded his fidelity by giving him in marriage Cleopatra, the daughter of Antony, by conferring upon him the title of king, and making him maſter of all the territories which his father once poſſeſſed. Juba governed his dominions with a ſpirit of juſtice and lenity which gained him the eſteem of his ſubjects. He diſtinguiſhed himſelf as a writer by various learned works, which related to the hiſtory and antiquities of the Arabians, Aſſyrians, and Romans. He wrote alſo the hiſtory of theatres, of painting and painters, of the nature and properties of different animals, and a particular treatiſe on the virtues of the herb Euphorbia. He died about the year 24 of the Chriſtian era, leaving a ſon, Ptolemy, afterwards put to death by Caligula. Juba is quoted with great applauſe by Pliny, Strabo, Plutarch, Tacitus, and ſome other authors. His popularity, as a ſovereign, was ſo great, that the Mauritanians rewarded his benevolence by making him one of their gods. The Athenians raiſed him a ſtatue, and the Æthiopians did him homage as a deity. Univer. Hiſt. Suet.

Juba, in *Geography*, a town of Syria, on the right banks of the Euphrates, on a narrow ſlip of land, formed by the winding of the river; 90 miles W.N.W. of Bagdad. N. lat. 33° 42′. E. long. 41° 58′.

JUBAL, an iſland in the Red ſea, N. lat. 27° 30′. E. long. 33° 40′.

JUBBIL, a town of the Arabian Irak, on the Tigris; 50 miles S.E. of Al Modain.

JUBBRA, a town of Bengal; 45 miles W.N.W. of Ramgur. N. lat. 23° 58′. E long. 84° 58′.

JUBE, the *Ambo, Rood Loft*, or gallery over the choir ſcreen in our ancient churches, from which the leſſons in the matins and other church offices uſed to be read. It was ſo called from the readers or cantors aſking the benediction of the abbot, dean, or other ſuperior, before he began, in the following form: "Jube Domine benedicere."

JUBILEE, among the *Jews*, denotes every fiftieth year: being that following the revolution of ſeven weeks of years; at which time all the ſlaves were made free, and all lands reverted to their ancient owners. The jubilees were not regarded áfter the Babyloniſh captivity.

The word, according to ſome authors, comes from the Hebrew *jobel*, which ſignifies *fifty*: but this muſt be a miſtake, for the Hebrew יובל, *jobel*, does not ſignify fifty; neither do its letters, taken as cyphers, or according to their numerical power, make that number; being 10, 6, 2, and 30, that is, 48. Others ſay, that *jobel* ſignifies a *ram*, and that the jubilee was thus called becauſe proclaimed with a ram's horn, in memory of the ram that appeared to Abraham in the thicket. Maſius chooſes to derive the word from *Jubal*, the firſt inventor of muſical inſtruments, which, for that reaſon, were called by his name; whence the word *jobel* and *jubilee* came to ſignify the year of deliverance and remiſſion, becauſe proclaimed with the ſound of one of thoſe inſtruments, which at firſt was no more than the horn of a ram. Hottinger, with whom Dr. Patrick agrees, is of opinion, that *Jobel* is a word invented to imitate the ſound of the inſtrument; and that it does not ſignify the inſtrument itſelf, but the ſound which it made. Others derive *jobel* from יבל, *jabal*, in hiphil הביל, *hobil*, which ſignifies to recal or return; becauſe this year reſtored all ſlaves to their liberty, &c. The inſtitution of this feſtival is in Lev. xxv. 8. 17.

The learned are divided about the year of jubilee; ſome maintaining that it was every forty-ninth, and others that it was every fiftieth year. The ground of the former opinion is chiefly this, that the forty-ninth year, being of courſe a ſabbatical year, if the jubilee had been kept on the fiftieth, the land muſt have had two ſabbaths, or have lain fallow two years, which, without a miracle, would have produced a dearth. On the other hand it is alleged, that the ſcripture expreſsly declares for the fiftieth year, Lev. xxv. 10, 11. And beſides, if the jubilee and ſabbatical year had been the ſame, there would have been no need of a prohibition to ſow, reap, &c. becauſe this kind of labour was prohibited by the law of the ſabbatical year. (Lev. xxv. 4, 5.) The authors of the Univerſal Hiſtory, book i. chap. 7. note R, endeavour to reconcile theſe opinions, by obſerving, that as the jubilee began in the firſt month of the civil year, which was the ſeventh of the eccleſiaſtical, it might be ſaid to be either the forty-ninth or fiftieth, according as one or other of theſe computations was followed. The political deſign of the law of the jubilee, was to prevent the too great oppreſſion of the poor, as well as their being liable to perpetual ſlavery. By this means the rich were prevented from accumulating lands for perpetuity, and a kind of equality was preſerved through all the families of Iſrael, and the diſtinction of tribes was alſo preſerved, in reſpect both to their families and poſſeſſions, that they might be able, when there was occaſion, on the jubilee year, to prove their right to the inheritance of their anceſtors. Thus alſo it would be known with certainty of what tribe or family the Meſſiah ſprung. It ſerved alſo, like the Olympiads of the Greeks, and the Luſtra of the Romans, for the readier computation of time. The jubilee has alſo been ſuppoſed to be typical of the goſpel ſtate and diſpenſation, deſcribed by Iſaiah, lxi. ver. 1, 2. in reference to this period, as the "acceptable year of the Lord."

Some learned men have attempted to prove by a calculation, thought by others to be tolerably exact, that if the Jews had ſtill obſerved the jubilees, the fifteenth year of Tiberius, when John the Baptiſt firſt began to preach, would have been a jubilee, and conſequently the laſt; ſince fifty years after, the Jewiſh commonwealth was no longer in being. This particular is of ſome conſequence, if it be well founded, in our controverſy with the Jews, who pretend, that the ſon of David will come during the laſt jubilee. And this alſo exactly agrees with the deſign of the goſpel, already ſtated, which was to proclaim the grand jubilee, the ſpiritual freedom of the children of God foretold by the prophets Iſaiah and Zechariah, and prefigured by the jubilees of the Jews. Uſher places the firſt jubilee, after the promulgation of the law by Moſes, A. M. 2609, B. C. 1395; the ſecond A. M. 2658, B. C. 1346; the third A. M. 2707, B. C. 1297, &c. thus reckoning 49 years from jubilee to jubilee.

JUBILEE, in a *more modern ſenſe*, denotes a grand church ſolemnity, or ceremony, celebrated at Rome, wherein the pope grants a plenary indulgence to all ſinners; at leaſt to as many as viſit the churches of St. Peter and St. Paul at Rome.

The jubilee was firſt eſtabliſhed by Boniface VIII. in 1300, in favour of thoſe who ſhould go *ad limina apoſtolorum*; and it was only to return every hundred years. But the firſt celebration brought in ſuch ſtore of wealth to Rome, that the Germans called this the golden year; which occaſioned Clement VI. 1350, to reduce the period of the jubilee to fifty years. Urban VI. in 1389, appointed it to be held every thirty-five years, that being the age of our Saviour; and Paul II. and Sixtus IV. in 1475, brought it down to every twenty-five, that every perſon might have the benefit of it once in his life.

Boniface IX. granted the privilege of holding jubilees to ſeveral princes and monaſteries: for inſtance to the monks of Canterbury, who had a jubilee every fifty years; when people flocked from all parts to viſit the tomb of Thomas à Becket. Jubilees afterwards became more frequent, and the pope granted them as often as the church, or himſelf, had occaſion for them. There was uſually one at the inauguration of a new pope.

To be entitled to the privileges of the jubilee, the bull injoins faſtings, alms, and prayers. It gives the prieſts a full power to abſolve, in all caſes, even thoſe otherwiſe reſerved to the pope; to make commutations of vows, &c. in which it differs from a *plenary indulgence*. During the time of jubilee, all other indulgences are ſuſpended.

See an enumeration of the various writers, who have treated of the inſtitution of the Roman jubilee, in the "Bibliogr. Antiq." of Jo. Albert Fabricius; and the ſubject fully ſtated by the reverend Charles Chais, formerly miniſter of the French church at the Hague, in his "Lettres Hiſtoriques et Dogmatiques ſur les Jubilés et des Indulgences," publiſhed at the Hague in three vols. 8vo. 1751. Theſe letters contain the moſt full and accurate account that has ever been given of the inſtitution of the jubilee, and of the riſe, progreſs, abuſes, and enormities of the infamous traffic of indulgences. This account is judiciouſly collected from the beſt authors of antiquity, and from ſeveral curious records that have eſcaped the reſearches of other writers: it is alſo interſperſed with curious and ſometimes ludicrous anecdotes, that render the work amuſing as well as inſtructive. In the firſt volume of theſe letters the learned author lays open the nature and origin of the inſtitution of the jubilee; he proves it to have been a human invention, which owed its *riſe* to the avarice and ambition of the popes; and its *credit* to the ignorance and ſuperſtition of the people; the celebration of which was abſolutely unknown before the thirteenth century, which is the true date of its origin. He takes notice of the various changes which it underwent with reſpect to the time of its celebration, the various colours with which the ambitious pontiffs covered it, in order to render it reſpectable and alluring in the eyes of the multitude; and expoſes theſe illuſions by many convincing arguments, the gravity of which is ſeaſoned with an agreeable and temperate mixture of decent raillery. He proves, with indiſputable evidence, that the papal jubilee is an imitation of the "ſecular games" that were celebrated with ſuch pomp in pagan Rome. He points out the groſs contradictions that reign in the bulls of the different popes, with reſpect to the nature of this inſtitution and the time of its celebration. Nor does he paſs over in ſilence the infamous traffic of indulgences, the wordly pomp and ſplendour, the crimes, debaucheries, and diſorders of every kind, that were obſervable at the return of each jubilee year. He lays alſo before the reader an hiſtorical view of all the jubilees that were celebrated from the pontificate of Boniface VIII. in the year 1300 to that of Benedict XIV. in 1750, with an entertaining account of the moſt remarkable adventures that happened among the pilgrims who repaired to Rome on theſe occaſions.

One of our kings, *viz.* Edward III. cauſed his birth-day to be obſerved in manner of a jubilee, when he became fifty years of age, in 1362, but never before or after. This he did, by releaſing priſoners, pardoning all offences, except treaſon, making good laws, and granting many privileges to the people.

We have lately, *viz.* in 1809, had a jubilee, on occaſion of our ſovereign George III. having attained to the fiftieth year of his reign.

There are particular jubilees in certain cities, when ſeveral of their feaſts fall on the ſame day; at Puey en Velay, for inſtance, when the feaſt of the Annunciation happens on Good-Friday; and at Lyons, when the feaſt of St. John Baptiſt concurs with the feaſt of Corpus Chriſti.

In 1640, the Jeſuits celebrated a ſolemn jubilee at Rome; that being the centenary, or hundredth year from their inſtitution, and the ſame ceremony was obſerved in all their houſes throughout the world.

JUBILÆUS, or Jubileus, is uſed among the Romaniſts, to ſignify a religious who has been fifty years in a monaſtery, or an eccleſiaſtic who has been in orders fifty years.

Such veteran religious are diſpenſed with in ſome places from attending matins, or a ſtrict obſervance of any other of their rules.

Jubilæus is alſo extended to any man a hundred years old; and to a poſſeſſion or preſcription for fifty years, "Si ager non invenietur in ſcriptione, inquiratur de ſenioribus, quantum temporis fuit cum altero; & ſi ſub certo jubilæo manſit ſine vituperatione, maneat in æternum."

JUBO, in *Geography*, a kingdom of Africa, on the coaſt of Ajan, near the Eaſt Indian ſea, with a capital of the ſame name, ſubject to the Portugueſe. N. lat. 0 50'. E. long. 43° 20'.—Alſo, a river of Africa, which runs into the Indian ſea, a little to the N. of the equinoctial line, E. long. 42° 46'.—Alſo, a town of Africa, in the kingdom of Benin.

JUBONES, a river of Peru, which runs into the Pacific ocean, S. lat 3° 20'.

JUCARICHI, a town of Mexico, in the province of New Biſcay; 110 miles N.W. of Patral.

JUCASETZ, a town of Sclavonia; 25 miles S. of Eſzek.

JUCATAN. See Yucatan.

JUCCA, in *Botany*, the name of a diſtinct genus of plants, otherwiſe called *Yucca.*

JUCENDRO, in *Geography*, a town of the iſland of Madagaſcar. S. lat. 23° 10'. E. long. 47° 14'.

JUCKASJERVI, a town of Swediſh Lapland; 145 miles N.W. of Tornea. N. lat. 67° 50'. E. long. 20° 46'.

JUCKATAGHERI, a town of Hindooſtan, in the Carnatic; five miles E. of Muglee.

JUCKING, the notes of a cock partridge, inviting the hen to come to him. Theſe ſerve the ſportſmen in good ſtead for finding the places where they are.

JUCLEZ, in *Geography*, a town of Turkeſtan; 45 miles S.W. of Turkeſtan.

JUCURUTA, in *Ornithology*, a very beautiful ſpecies of owl, found in the Brazils, and variegated with black and yellow.

JUD, in *Mining*, is applied, in the collieries in Derbyſhire, to a certain depth of coal in the face of their work, which will fall at once, after the holers have undermined the ſame, and the hammer-men have applied their wedges near to the roof: it is alſo called the web, and the rib of coal in ſome places, and is limited, like the face of the coal, by parallel vertical ſlines or lengthway joints; the backs of Newcaſtle colliers.

JUDÆ Auricula. See Auricula.

JUDÆA. See Judea.

JUDAH, in *Scripture Biography*, the fourth ſon of Jacob and Leah, was born in Meſopotamia, A.M. 2249, B.C. 1755; and was always regarded as the chief of Jacob's children. The privileges of the firſt-born ſeem to have been transferred from Reuben to him, after the inceſt of Reuben with Bilhah his father's wife. For the bleſſing pronounced by Jacob on his death-bed to Judah, ſee Gen. xlix. 8—12. That part of it which occurs in the 10th verſe, ſeems to imply, that the regal power ſhould not go out of his family, and that the Meſſiah ſhould derive his birth from it.

Judah, Leo, in *Biography*, a learned Proteſtant divine, ſon of John Judah, a German prieſt, was born in the year 1482. When he was about twenty years of age, he was ſent to Baſil to purſue his academical ſtudies. Here he had for a fellow ſtudent, the afterwards much celebrated Zuingle, and from him, who had at a very early age been ſhocked at the ſuperſtitious practices of the church of Rome, he received ſuch impreſſions, and was directed to ſuch enquiries, as prediſpoſed him to embrace the reformed religion. Having obtained his degree of M.A. he was appointed miniſter of a Swiſs church, to the duties of which he applied himſelf with indefatigable zeal. His ſtudies led him to renounce the diſtinguiſhing tenets of popery, and an adoption of thoſe of the reformation. He openly preached in defence of the Proteſtant religion, was appointed by the magiſtrates and eccleſiaſtical aſſembly of Zurich paſtor of the church of St. Peter in that city, and became very celebrated as an advocate, as well from the preſs as the pulpit, of the ſyſtem to which he was a convert. At the deſire of his brethren, he undertook a tranſlation, from the Hebrew into Latin, of the whole Old Teſtament. The magnitude of the work, and the cloſeneſs with which he applied to it, were more than he was able to bear, and before he had completed it, he fell a ſacrifice to his labours in 1542, when he was about ſixty years of age. The tranſlation was finiſhed by other hands, and was printed at Zurich in 1543, and two years afterwards it was reprinted at Paris by Robert Stevens, accompanying the vulgate verſion, in adjoining columns, but without the name of the author of the new verſion. Judah was likewiſe the author of "Annotations"

tions" on divers books of the Old and New Teſtament, and of two catechiſms. Gen. Biog.

Judah, *Tribe of*, in *Scripture Geography*, a canton of Paleſtine, which extended S. of Benjamin, about 27 miles, quite to the mountains of Seir, or Edom, which were the frontiers between it and Idumæa. It was bounded on the E. by the Dead ſea, and on the W. by the tribes of Dan and Simeon, both which lay between it and the Mediterranean. Judah was reckoned the largeſt and moſt populous tribe of all the twelve, and the inhabitants were the ſtouteſt and moſt valiant. It was, moreover, the chief and royal tribe, from which the kingdom was denominated. The land was beautifully variegated with fertile plains, hills, dales, lakes, and fountains, and it produced great plenty of corn, wine, oil, fruits, and paſture, except where it lay contiguous to Idumæa. It was properly in this territory of Judah, that the Canaanites dwelt, and here Abraham and his deſcendants ſojourned, till they went down into Egypt. The moſt remarkable places of this tribe were Azekah, Bethlehem, Bethzor, Emmaus, Engedi, Hebron, Libna, Makkedah, Maon, Maſſada, Tekoah, and Ziph; which ſee reſpectively.

One of the principal prerogatives of this tribe was, that it preſerved the true religion, and the public exerciſe of the prieſthood, with the legal ceremonies in the temple of Jeruſalem; while the ten tribes gave themſelves up to idolatry, and the worſhip of the golden calves. This tribe, at the Exodus, was compoſed of 74,600 men, capable of bearing arms.

Judah, *Kingdom of*, a denomination given to the maimed kingdom of Rehoboam, in contradiſtinction to that of Iſrael, upon the revolt of the ten tribes. The crown paſſed from Benjamin (from Saul and Iſhboſheth) into Judah, which was David's tribe, and that of the kings his ſucceſſors, until the Babyloniſh captivity. And after the return from that captivity, although this tribe did not reign, it gave the ſceptre to thoſe who did reign, and in a certain ſenſe reunited in itſelf the whole Hebrew nation, which from that time was known only as "Judæi," Jews, deſcendants of Judah. See Jews and Israel.

JUDAICUS Lapis, a ſmall, grey, ſoft, brittle ſtone, in form of an olive, having lines drawn regularly on its ſurface, as if they were formed by art.

This is a kind of extraneous foſſil, being a ſpine of an echinus marinus petrified. This ſtone has by many been ſuppoſed to be a foſſil body in its native figure, but is really the remains of a ſpine of an echinus, filled with a plated ſpar. It is very common in Syria, and is ſometimes found with us. See Spar.

Theſe extraneous foſſils are the petrified ſpines of echini, aculei echinorum, or tecolithi of Pliny, which the chalk ſtrata, and thoſe of the Bath freeſtone in England, produce in great perfection and variety of ſhapes; ſome of them occaſioned by diſeaſe in the animal, as is probable, from the obſervations of Mr. Sowerby. It is not very common, that the ſpines are found attached to the foſſil echini: a ſpecimen of this kind, imbedded in a black flint, ſold for 20 guineas, we are told, at the ſale by auction of the late ſir Aſton Lever's muſeum. The foſſil ſpines of moſt of the echini differ ſo much from the recent ſpines, that Linnæus doubted whether they really were ſuch, a matter now placed beyond any doubt, by the diſcovery of ſpecimens like that above mentioned.

JUDAISM, the religious doctrines and rites of the Jews, which, as well as their commonwealth, (ſee Theocracy,) are attributed by Moſes wholly to God. Judaiſm was but a temporary diſpenſation, and was to give way, at leaſt the ceremonial part of it, at the coming of the Meſſiah. For a complete ſyſtem of Judaiſm, ſee the books of Moſes. Judaiſm was anciently divided into ſeveral ſects; the principal whereof were the *Phariſees*, *Sadducees*, and *Eſſenes*; which ſee reſpectively.

At preſent there are two ſects among the Jews, *viz.* the *Caraites*, (which ſee,) who admit of no rule of religion but the law written by Moſes; and the Rabbiniſts, who add to the law the traditions of the Talmud. See Rabbinists and Talmud.

It has been obſerved that Judaiſm, of all religions, is that which is the moſt rarely abjured. In the 18th of Edward I. the parliament granted the king a fifteenth for the expulſion of Judaiſm.

In England formerly, the Jews and all their goods belonged to the chief lord where they lived, and he had ſuch abſolute property in them, that he might ſell them; for they had not liberty to remove to another lord without leave. Mat. Paris tells us, that Henry III. ſold the Jews to earl Richard, his brother, for a term of years, that *quos rex excoriaverat, comes eviſceraret.*

They were diſtinguiſhed from the Chriſtians both living and dying; for they had proper judges and courts wherein their cauſes were tried, and they wore a badge on their breaſt over their clothes in ſhape of a table; and they were fined, if they ſtirred abroad without ſuch badges. They were never buried in the country, but always brought up to London, and interred without the walls.

JUDAN, in *Geography*, a town of Hindooſtan, in Baglana; 20 miles W. of Junere.

JUDAS Maccabæus. See Maccabees.

Judas-*tree*, in *Botany*. See Cercis.

JUDDA, in *Geography*, a town of Hindooſtan, in the circar of Gurrah; 10 miles E. of Mahur.

JUDE, or *the Epiſtle of Jude*, a canonical book of the New Teſtament, written againſt the heretics, who, by their impious doctrines and diſorderly lives, corrupted the faith and good morals of the Chriſtians.

The author of this epiſtle, called Judas, and alſo Thaddeus and Lebbeus, was one of the 12 apoſtles; he was the ſon of Alpheus, brother of James the Leſs, and one of thoſe who were called our Lord's brethren. We are not informed, when or how he was called to be an apoſtle; but it has been conjectured, that before his vocation to the apoſtleſhip he was an huſbandman, that he was married, and that he had children. The only account we have of him in particular, is that which occurs in John, xiv. 21, 22, 23. It is not unreaſonable to ſuppoſe, that, after having received, in common with the other apoſtles, extraordinary gifts at the pentecoſt, he preached the goſpel for ſome time in ſeveral parts of the land of Iſrael, and wrought miracles in the name of Chriſt. And, as his life ſeems to have been prolonged, it is probable that he afterwards left Judea, and went abroad preaching the goſpel to Jews and Gentiles in other countries. Some have ſaid that he preached in Arabia, Syria, Meſopotamia, and Perſia; and that he ſuffered martyrdom in the laſt-mentioned country. But we have no account of his travels upon which we can rely; and it may be queſtioned whether he was a martyr.

In the early ages of Chriſtianity, ſeveral rejected the Epiſtle of St. Jude, becauſe the apocryphal books of Enoch, and the aſcenſion of Moſes, are quoted in it. Nevertheleſs it is to be found in all the ancient catalogues of the ſacred writings; and Clement of Alexandria, Tertullian, and Origen, quote it as written by Jude, and reckon it among the books of ſacred ſcripture: in the time of Euſebius it was generally received. As to the objections that have been urged againſt its authority, Dr. Lardner ſuggeſts, that there is no neceſſity for ſuppoſing that St. Jude quoted a book called Enoch, or Enoch's prophecies; and even allowing that he did quote it, he gives it no authority; it was no canonical book of the Jews, and if ſuch a book exiſted among the Jews, it was apocryphal, and yet there might be in it ſome right things. Inſtead of referring to a book, called the "Aſſumption or Aſcenſion of Chriſt," which probably was a forgery much later than his time, it is much more credible, that St. Jude refers to the viſion in Zech. iii. 1—3. It has been the opinion of ſeveral writers, and among others of Hammond and Benſon, that St. Jude addreſſed his epiſtle to Jewiſh Chriſtians; but Dr. Lardner infers, from the words of the inſcription of the epiſtle v. 1, and v. 3, that it was deſigned for the uſe of all in general, who had embraced the Chriſtian religion. The laſt mentioned author ſuppoſes, that this epiſtle was written in the year of Chriſt 64, 65, or 66. Lardner's Works, vol. vi. See EPISTLE.

JUDEA, in *Ancient Geography*, a province of Aſia, more anciently called the *land of Canaan*, the *land of Promiſe*, the *Holy Land*, and *Paleſtine*; which ſee. It was called *Judea*, from Judah, whoſe tribe was the moſt conſiderable of the 12, and poſſeſſed the moſt fertile part of the whole. It did not aſſume the name of Judea, till after the return of the Jews from the Babyloniſh captivity, though it had been denominated, long before, the kingdom of Judah, in oppoſition to that of Iſrael. After their return, this tribe, which was the only one that made a figure, ſettled firſt at Jeruſalem, and in the adjacent territories, and then ſpread through the whole country, ſo that the name of Jehudah and Jehudim extended itſelf to all the reſt. (See JUDAH.) Judea was alſo called Syria, Palæſtina-Syria, Cœle-Syria, and Phœnicia. It was alſo called Idumæa, merely becauſe the Idumæans ſeized on ſome parts of it during the Babyloniſh captivity. The modern name, eſpecially among Chriſtians and Mahometans, is *Paleſtine*; which ſee.

Before the arrival of the Hebrews, Judea was governed by Canaanitiſh kings, each in his reſpective city. (See CANAAN.) When Joſhua conquered it, he governed it as the vicegerent of Jehovah, according to the form of the Jewiſh theocracy. The elders ſucceeded Joſhua, about 15 years; after which the Iſraelites fell into a kind of anarchy for ſeven or eight years. They were governed by Judges for about 317 years; then by kings from Saul to the Babyloniſh captivity about 507 years. After the captivity, Judah continued ſubject to the kings of Perſia, then to Alexander the Great, and his ſucceſſors; ſometimes to the kings of Syria, ſometimes to the kings of Egypt; paying, nevertheleſs, great deference, in matters of private government, to the high prieſt, and to princes of the family of David. From the time of the Maccabees, they continued in poſſeſſion of the ſovereign authority, till the reign of Herod the Great, about 135 years. See JEWS.

JUDENBACH, in *Geography*, a town of Germany, in the principality of Coburg; 12 miles N.E. of Coburg.

JUDENBURG, a town and capital of Upper Stiria, on the river Muehr, on a plain ſurrounded with lofty mountains, always covered with ſnow. It has a caſtle, college, and two convents. The French took it in 1797; 32 miles W.N.W. of Gratz. N. lat. 47° 10′. E. long. 14° 25′.

JUDGE, an officer appointed by the ſovereign powers of any country, to diſtribute that juſtice to their ſubjects which they cannot adminiſter in perſon.

The character of judge is part of the regal authority, whereof the king diveſts himſelf.

The chief function of judges is for the trial of cauſes both civil and criminal.

The Engliſh Judges are choſen out of the ſerjeants at law, and are conſtituted by letters patent. Their commiſſions are bounded with this limitation, "facturi quod ad juſtitiam pertinent ſecundum legem & conſuetudinem Angliæ:" and at their creation they take an oath, that they will indifferently miniſter juſtice to all them that ſhall have any ſuit or plea before them; and this they will not forbear to do, though the king by his letters, or by expreſs word of mouth, ſhould command the contrary; and they are anſwerable in body, land, and goods. 18 Ed. III. c. 1.

By the law of England all judges muſt derive their authority from the crown, by ſome commiſſion warranted by law. The judges of the king's bench, common pleas, and the barons of the exchequer, are all (excepting the chief juſtice of the king's bench, who is created by writ) appointed by patent. Formerly they held their places only during the king's pleaſure; but now, for the greater ſecurity of the liberty of the ſubject, by ſtatute 13 Will. III. c. 2. their commiſſions are to be *quamdiu ſe bene geſſerint*, and their ſalaries are aſcertained and eſtabliſhed; and by 1 Geo. III. cap. 23. they are to continue, notwithſtanding the demiſe of the crown; and their full ſalaries are abſolutely ſecured to them during the continuance of their commiſſions. Though upon an addreſs of both houſes of parliament they may be lawfully removed.

Judges muſt exerciſe their authority in a legal manner, and hold their courts in their proper perſons; for they cannot act by deputy, nor any way transfer their power to another, as the judges of eccleſiaſtical courts may. Yet when there are ſeveral judges in a court of record, the act of any one of them is effectual, provided their commiſſions do not require more: ſo likewiſe what is executed by a majority preſent, is the act of the court; but where they are equally divided in opinion, the cauſe is to be removed into the exchequer chamber, and for that purpoſe a rule is to be made, and the record certified, &c. Some things done by judges at their chambers are accounted as done by the court; and that they may be prepared to hear what is to come before them, they are to have a paper of the cauſes to be heard, ſent to them by the attornies the day before they are ſpoken to; that if, upon reading the record of any cauſe, any ſpecial matter that ariſes ſhould appear doubtful, they may ſatisfy themſelves by conſulting books.

The judges are bound by oath to determine according to the known laws and ancient cuſtoms of the realm. Their rule herein muſt be the judicial deciſions and reſolutions upon the various cauſes that have occurred, and not their own arbitrary will and pleaſure, or that of their prince.

Judges are free from all proſecutions for any thing done by them in court, which appears to have been an error of their judgment. But for wilful corruption, they have been complained of to the ſtar-chamber formerly, and may now be called to an account in parliament.

It has been ſaid, that ſcandalous reflections on the judges in Weſtminſter-hall are within the ſtatute of *ſcandalum magnatum*.

Thoſe who uſe threatening or reproachful words to a judge ſitting in the courts, are guilty of a high miſpriſion, and have been puniſhed with large fines, impriſonment, and corporal puniſhment. (Cro. Car 503.) Aſſaulting a judge, ſitting in the court, by drawing a weapon, without any blow ſtruck, is puniſhable with the loſs of the right hand, impriſonment for life, and forfeiture of goods and chattels, and of the profits of the perſon's lands during life (3 Inſt.

140.

140, 141.); and ſlaying the chancellor, treaſurer, or the king's juſtices of either bench, juſtices in eyre, or juſtices of aſſize, and all other juſtices aſſigned to hear and determine, being in their places doing their offices, is a ſpecies of treaſon by 25 Edw. III. c. 2. However, the barons of the exchequer, as ſuch, are not within the protection of this act. (1 Hal. P. C. 231.) Judges, who become ſolicitors in a cauſe which they are to judge, and privately and extrajudicially tamper with witneſſes, or labour jurors, may be dealt with according to the ſame capacity to which they baſely degrade themſelves. Bribery in judges is puniſhable by loſs of office, fine, and impriſonment; and by the common law, bribery of judges in relation to a cauſe depending before them, has been puniſhed as treaſon. If a judge ignorantly condemns a man to death for felony, when it is not felony; for this offence he ſhall be fined and impriſoned, and loſe his office. If a judge, who hath no juriſdiction of the cauſe, give judgment of death and award execution, which is executed, ſuch judge is guilty of felony; and alſo the officer who executes the ſentence. And if juſtices of the peace, on indictments of treſpaſs, arraign a man of felony, and judge him to death, and he is executed, it is felony in them. A judge ought not to judge in his own cauſe, nor in pleas where he is party.

It was formerly enacted, ſtat. 33 Hen. VIII. c. 24. that none ſhould be juſtices of aſſizes within the county where they were born, or do inhabit: but this is repealed by a late ſtatute, 12 Geo. II. c. 27.

It was formerly held, that by a juſtice's acceptance of any new name of dignity, his commiſſion was determined; but this was remedied by ſtatute 1 Edw. VI. c. 7. But it has been doubted, whether the dignity of baronet, created ſince that ſtatute, is within the equity of it.

Judges *of Hell.* See Hell and Tartarus.

Judge, *Itinerant.* See Itinerant.

Judge *Martial,* or *Advocate General,* the ſupreme judge in martial law as to the juriſdiction and powers of military courts. It is incumbent upon this perſon, as well as upon his deputies, to be well acquainted with the laws of the land, that they may admoniſh the court or preſident when their proceedings are tending to infringe the civil law. He is regiſter of courts-martial, and ſhould take down the evidence in the very words of the witneſs. He is neither a judge nor a juror as to the charge.

Judge, in *Scripture,* is applied to certain eminent perſons choſen by God himſelf to govern the Jews, from the time of Joſhua till the eſtabliſhment of the kings. For the nature and duration of their office, and the powers with which they were inveſted, ſee Jews.

The judges were not ordinary magiſtrates, but were appointed by God on extraordinary occaſions, as to head the armies, to deliver the people from their enemies, &c.—Salian has obſerved that they not only preſided in courts of juſtice, but were alſo at the head of the councils, the armies, and of every thing that concerned the government of the ſtate; though they never aſſumed the title either of princes, governors, or the like.

Salian remarks ſeven points wherein they differed from kings. 1. They were not hereditary. 2. They had no abſolute power of life and death, but only according to the laws, and dependently upon them. 3. They never undertook war at their own pleaſure, but only when they were commanded by God, or called to it by the people. 4. They exacted no tribute. 5. They did not ſucceed each other immediately, but after the death of one there was frequently an interval of ſeveral years before a ſucceſſor was appointed. 6. They did not uſe the enſigns of ſovereignty, the ſceptre or diadem. 7. They had no authority to make any laws, but were only to take care of the obſervance of the laws of Moſes.

Godwin, in his "Moſes and Aaron," compares them to the Roman dictators, who were appointed only on extraordinary emergencies, as in caſe of war abroad, or conſpiracies at home; and whoſe power, while they continued in office, was great, and even abſolute. Thus the Hebrew judges ſeem to have been appointed only in caſes of national trouble and danger. This was the caſe particularly with reſpect to Othniel, Ehud, and Gideon. The power of the judges, while in office, was very great; nor does it ſeem to have been limited to a certain time, like that of the Roman dictators, which continued for half a year: nevertheleſs it is reaſonable to ſuppoſe, that when they had performed the buſineſs for which they were appointed, they retired to a private life. This Godwin infers from Gideon's refuſing to take upon him the perpetual government of Iſrael, as being inconſiſtent with the theocracy.

Beſides theſe ſuperior judges, every city in the Hebrew commonwealth had its elders, who formed a court of judicature, with a power of determining leſſer matters in their reſpective diſtricts. The rabbies ſay, there were three ſuch elders or judges in each leſſer city, and twenty-three in greater. But Joſephus, whoſe authority has greater weight, ſpeaks of ſeven judges in each, without any ſuch diſtinction of greater and leſs. Sigonius (De Republ. Heb. l. vi. c. 6.) ſuppoſes that theſe elders and judges of cities were the original conſtitution ſettled in the wilderneſs by Moſes, upon the advice given him by Jethro (Exod. xxviii. 21, 22.); and continued by divine appointment after the ſettlement in the land of Canaan: whereas, others imagine that the Jethronian prefectures were a peculiar conſtitution, ſuited to their condition while encamped in the wilderneſs, but laid aſide after they came into Canaan. It is certain, however, that there was a court of judges and officers, appointed in every city, by the law of Moſes. (Deut. xvi. 18.) How far, and in what reſpects, theſe judges differed from the elders of the city, it is not eaſy to aſcertain; and whether they were the ſame or different perſons. Perhaps the title elders may denote their ſeniority and dignity; and that of judges, the office they ſuſtained. The lower courts of juſtice, in their ſeveral cities, were held in their gates. (Deut. xvi. 16.) See Gate. Each tribe had its reſpective prince, whoſe office related chiefly, if not altogether, to military affairs. We read alſo of the princes of the congregation, who preſided in judiciary matters. Theſe are called elders, and were ſeventy in number. (Numb. xi. 16, 17. 24, 25.) But it does not appear whether or not this conſiſtory of ſeventy elders was a perpetual, or only a temporary inſtitution. Some have ſuppoſed that it was the ſame that afterwards became famous under the appellation of Sanhedrim; but others conceive the inſtitution of the ſeventy elders to have been only temporary, for the aſſiſtance of Moſes in the government, before the ſettlement in the land of Canaan; and that the Sanhedrim was firſt ſet up in the time of the Maccabees. See Sanhedrim.

Judge, in *Mining,* is applied, in the coal-pits of Nottinghamſhire and Derbyſhire, to a piece of board cut to a wedge-like ſhape, which ſhould fit exactly into any part of the excavation made under the face or bank of the coals, by the holers, in order to looſen them. The length of the judge is regulated by the depth or width of the jud, or web of coal which will fall at once: and the overlooker is required daily to try the judge in the holing, to ſee that the holers undermine ſufficiently far back; and yet, in order to ſave themſelves trouble, do not make the hole higher than the judge, and thereby cut away and waſte the jud of coal. Theſe proceſſes of coal-digging are particularly deſcribed in Mr. Farey's Report, vol. i. p. 344.

Judges, or *Book of Judges,* is a canonical book of the Old Teſtament, containing the hiſtory of the Iſraelite judges, of whom we have been ſpeaking in a preceding article.

The author is not known: it is probable the work did not come from any ſingle hand, being rather a collection of ſeveral little hiſtories, which at firſt were ſeparate, but were afterwards collected by Ezra, or Samuel, into a ſingle volume; and, in all likelihood, were taken from the ancient journals, annals, or memoirs, compoſed by the ſeveral judges.

The antiquity of this book is unqueſtionable, as it muſt have been written before the time of David; ſince the deſcription (chap. i. v. 21.) was no longer true of Jeruſalem, after he had taken poſſeſſion of it, and had introduced a third claſs of inhabitants of the tribe of Judah. Eichorn acknowledges, that it doth not bear any marks of ſubſequent interpolation. Dr. Patrick is of opinion that the five laſt chapters are a diſtinct hiſtory, in which the author gives an account of ſeveral memorable tranſactions, which occurred in or about the time of the judges; whoſe hiſtory he would not interrupt by intermixing theſe matters with it, and therefore reſerved them to be related by themſelves, in the ſecond part, or appendix. In theſe he firſt gives an account how idolatry crept into the tribe of Ephraim, then how it was propagated among the Danites; after which he relates a moſt heinous act of adultery, committed in the tribe of Benjamin; which introduces the hiſtory, firſt, of the almoſt total deſtruction of that tribe for their countenancing that deteſtable fact, and then of its reſtoration. Eichorn alſo ſuppoſes that theſe chapters are diſtinct fragments of a leſs certain date, but poſterior to David (chap. xviii. v. 31.), under whom the houſe of God ceaſed to be in Shiloh.

JUDGMENT, or the ſecond operation of the mind in the acquiſition of knowledge (the firſt being perception), is a faculty of the ſoul, by which it perceives the relation between two, or more, ideas: or the concurrence or coincidence of two ideas, or the want of concurrence or coincidence. Two ideas, being compared together, concur, as in the inſtance of milk and whiteneſs; and they coincide, as in thoſe of God and Creator; or they do not concur, as vice and uſefulneſs, or they do not coincide, as man and brute.

Thus, when we judge, that the ſun is greater than the moon, the underſtanding firſt compares the two ideas of the ſun and the moon; and, finding the idea of the ſun greater than that of the moon, the will perfectly acquieſces in that perception, nor puts the mind upon any farther enquiry.

It is not the underſtanding, then, that judges, as is ordinarily thought; judgments and reaſonings on the part of the underſtanding, are but mere perceptions; it is the will alone that judges, by acquieſcing in what is repreſented to it by the underſtanding.

The only difference, then, between *perception*, *judgment*, and *reaſoning*, ſo far as the underſtanding is concerned in them, is this; that it perceives a thing ſimply, without any relation to any other thing, in a ſimple perception; that it perceives the relations between two or more things in judgments; and, laſtly, that it perceives the relations that are between the relations of things in reaſonings; ſo that all the operations of the underſtanding are in effect no more than pure perceptions.

Thus, when we perceive, for inſtance, twice 2, or 4, this is no more than a ſimple perception; when we judge, that twice 2 are 4, or that twice 2 are not 5, the underſtanding does no more than barely perceive the relation of equality that is between twice 2 and 4, or of inequality between twice 2 and 5. Farther, reaſoning conſiſts in perceiving the relation, not between two or more things, for that would be a judgment, but of two or more relations of two or more things: thus, when I conclude, that 4 being leſs than 6, twice 2 being 4, are by conſequence leſs than ſix; I perceive not only the relation of inequality between 2 and 4, and 6 (for this were only a judgment), but alſo the relation of inequality between the relation of twice 2 and 4, and the relation between 4 and 6; which conſtitutes a reaſoning. The underſtanding, therefore, only perceives, and it is the will that judges and reaſons, in aſſenting voluntarily to what the underſtanding repreſents.

Indeed, when the things which we conſider appear clear and perfectly evident, it ſeems as if it were not voluntarily, that the mind conſents to them; whence we are led to think, that it is not properly the will, but the underſtanding that judges of them. But to clear this point it muſt be obſerved, that the things which we conſider, never appear entirely evident, till the underſtanding has examined them on all ſides, and has perceived all the relations neceſſary to judge of them; whence it happens, that the will, not being able to will any thing without knowledge, cannot act on the underſtanding; that is, cannot deſire it to repreſent any thing new in its object, as having already viewed it on all ſides that have any relation to the queſtion in hand. It is obliged then to reſt in what has been already repreſented, and to ceaſe to agitate and diſturb it any farther; in which ceſſation it is that judgment conſiſts.

This reſt or judgment, then, not being free when things are in their laſt evidence, we are apt to imagine, that it is not the effect of the will. So long as there is any thing obſcure in the ſubject that we conſider, or that we are not fully ſatisfied that we have diſcovered every thing neceſſary to reſolve the queſtion, as it happens in moſt of thoſe things that are difficult, and that contain various relations; we remain at liberty not to acquieſce: the will may command the underſtanding to purſue its enquiries farther, and to make new diſcoveries, whence it is, that we are more ready to allow the judgments formed on theſe ſubjects to be voluntary.

Moſt philoſophers, however, maintain, that even the judgments which we form on obſcure things are not voluntary; and will have our conſenting to the truth to be an action of the underſtanding, which they call *aſſent,* to diſtinguiſh it from our conſenting to goodneſs, which they attribute to the will, and call it *conſent*.

But their error is owing to this, that in our preſent ſtate we frequently ſee things to be evidently true, without the leaſt reaſon to doubt of them; in which caſe the will is not at liberty either to give or refuſe her aſſent: but it is not ſo in matters of goodneſs; there being nothing, which we do not know ſome reaſon for forbearing to love. So that we here perceive a manifeſt indifference, and are fully convinced, that when we love any thing, even God, for inſtance, we uſe our liberty, and do it voluntarily. But the uſe we make of our liberty is not ſo apparent, when we conſent to the truth, eſpecially when it appears perfectly evident: and this leads us to think, that our conſent to truth, that is, our judgment, is not voluntary; as if an action, to be voluntary, muſt be indifferent; as if the bleſſed above did not love God voluntarily,

tarily, becauſe they cannot be diverted from it by any other thing; nor we conſent freely to this evident propoſition, that twice 2 are 4, becauſe we have no appearance of reaſon to diſſuade us from it.

Mr. Locke (b. iv. c. 14.) diſtinguiſhes between knowledge and judgment; the former being that faculty of the mind, by which it certainly perceives, and is undoubtedly ſatisfied of the agreement or diſagreement of any ideas; the latter, or judgment, is the putting of ideas together, or the ſeparating of them from one another in the mind, when their certain agreement or diſagreement is not perceived, but preſumed to be ſo; which is, as the word imports, taken to be ſo before it certainly appears; and if it ſo unites or ſeparates them, as in reality things are, it is right judgment. A judgment, called by Mr. Locke a mental propoſition, is that union or ſeparation of the ideas which is the reſult of the act of judging; and this may exiſt without any connection with words; though, as men are very much uſed to connect ideas with words, it is very difficult to treat of judgments as diſtinguiſhed from verbal propoſitions. (See PROPOSITION.) The ſources of judgment are conſciouſneſs, ſenſe, intuition, and teſtimony. See each of theſe articles reſpectively. The definition commonly given of judgment, by the more ancient writers in logic, was, that it is an act of the mind, by which one thing is affirmed or denied of another. Dr. Reid thinks this to be as good a definition as can be given, and prefers it to ſome others; but it is evidently liable to objections, which he has ſtated. Judgment is a ſolitary act of the mind, and the expreſſion of it by affirmation or denial is not at all eſſential to it; and therefore the definition muſt be reſtricted to mental affirmation or denial, which, as he ſays, is only another name for judgment. Beſides, affirmation or denial is very often the expreſſion of teſtimony, which is a different act of the mind, and ought to be diſtinguiſhed from judgment. Judgment, as Dr. Reid proceeds to obſerve, is an act of the mind ſpecifically different from ſimple apprehenſion, or the bare conception of a thing; for although there can be no judgment without a conception of the things about which we judge, yet conception may be without any judgment. Judgment can be expreſſed by a propoſition only, and a propoſition is a complete ſentence; but ſimple apprehenſion may be expreſſed by a word or words, which make no complete ſentence. It is ſelf-evident, that every judgment muſt be either true or falſe; but ſimple apprehenſion or conception can neither be true nor falſe. Again, one judgment may be contradictory to another; and it is impoſſible for a man to have two judgments at the ſame time, which he perceives to be contradictory. But contradictory propoſitions may be conceived at the ſame time without any difficulty. Dr. Reid obſerves, that there are ſome notions or ideas that ought to be referred to the faculty of judgment as their ſource; becauſe if we had not that faculty, they would not enter into our minds; *e.g.* we could not have the idea of any relation without ſome exerciſe of judgment, and yet the relations of things conſtitute one great claſs of our notions or ideas. It is further remarked, that in perſons come to years of underſtanding, judgment neceſſarily accompanies all ſenſations, perception by the ſenſes, conſciouſneſs and memory, but not conception. The man who feels pain, judges and believes that he is really pained; a perſon who perceives an object believes that it exiſts, and is what he diſtinctly perceives it to be; nor is it in his power to avoid ſuch judgment; and the ſame may be ſaid of memory and conſciouſneſs. All operations of this kind are accompanied with a determination that ſomething is true or falſe, and a conſequent belief. If this determination be not judgment, it is an operation without a name; for it is not ſimple apprehenſion, neither is it reaſoning; it is a mental affirmation or negation; it may be expreſſed by a propoſition affirmative or negative, and it is accompanied with the firmeſt belief. "Theſe," ſays Dr. Reid, "are the characteriſtics of judgment, and I muſt call it judgment, till I can find another name for it." The judgments we form are either of things neceſſary, or of things contingent. Our aſſent to neceſſary propoſitions is not grounded upon any operation of ſenſe, of memory, or conſciouſneſs, nor does it require their concurrence; it is unaccompanied by any other operation but that of conception, which muſt accompany all judgment; and therefore this judgment of things neceſſary may be called pure judgment. Our judgment of things contingent muſt always reſt upon ſome other operation of the mind, ſuch as ſenſe or memory, or conſciouſneſs, or credit in teſtimony.

In common language, there are many forms of ſpeech which ſhew that the ſenſes, memory, and conſciouſneſs, are conſidered as judging faculties. Evidence is the ground of judgment, and when evidence is perceived, it is impoſſible not to judge. Dr. Reid, adverting to the notion of judgment, which, he thinks, is peculiar to Mr. Locke, and which we have already ſtated, expreſſes his opinion, that there can be no knowledge without judgment, though there may be judgment without that certainty which we commonly call knowledge. In order to avoid diſputes about the meaning of words, this author wiſhes to be underſtood as giving the name of judgment to every determination of the mind concerning what is true or what is falſe. This, he thinks, is what logicians, from the days of Ariſtotle, have called judgment. "Whether it be called one faculty," he ſays, "as I think it always has been, or whether a philoſopher chuſes to ſplit it into two, ſeems not very material. And if it be granted, that by our ſenſes, our memory and conſciouſneſs, we not only have ideas or ſimple apprehenſions, but form determinations concerning what is true and what is falſe; whether theſe determinations ought to be called *knowledge* or *judgment*, is of ſmall moment."—"Philoſophers," ſays the ſame writer, "have never been able to give any definition of judgment which does not apply to the determination of our ſenſes, our memory, and conſciouſneſs, nor any definition of ſimple apprehenſion which can comprehend thoſe determinations." Judgments of this kind may, in the ſtricteſt ſenſe, be called "judgments of nature," nor do they admit of improvement by culture.

Dr. Reid further obſerves, that ſome exerciſe of judgment is neceſſary in the formation of all abſtract and general conceptions, whether they be more ſimple or more complex; in dividing, in defining, and, in general, in forming all clear and diſtinct conceptions of things, which are the only fit materials of reaſoning. He adds, that all our notions of relations may more properly be aſcribed to judgment as their ſource and origin, than to any other power of the mind. The notions of unity and number are ſo abſtract, that it is impoſſible they ſhould enter into the mind until it has ſome degree of judgment. Judgment is alſo an ingredient in all matters of taſte; in all moral determinations; and in many of our paſſions and affections. So that this operation, after we come to have any exerciſe of judgment, mixes with moſt of the operations of our minds, and, in analyſing them, cannot be overlooked without confuſion and error. Reid's Eſſays, eſſ. vi. chap. 1.

JUDGMENT, in a *Legal Senſe*, is a ſentence or deciſion pronounced by authority of a king, or other power, either by their own mouth, or by that of their judges, and officers, whom they appoint to adminiſter juſtice in their ſtead.

Judgments are the ſentence of the law, pronounced by the court upon the matter contained in the record; and they are of four ſorts. 1ſt. Where the facts are confeſſed by the parties, and the law determined by the court; as in caſe of judgment upon *demurrer*. (See DEMURRER.) 2dly. Where the law is admitted by the parties, and the facts diſputed; as in caſe of judgment upon a *verdict*. (See VERDICT.) 3dly. Where both the fact and the law ariſing thereon are admitted by the defendant; which is the caſe of judgments by *confeſſion* or *default*. (See thoſe articles.) 4thly. Where the plaintiff is convinced that either fact, or law, or both, are inſufficient to ſupport his action, and therefore abandons or withdraws his proſecution; which is the caſe in judgments upon a *nonſuit* or *retraxit*; which ſee.

The judgment, though pronounced or awarded by the judges, is not their determination or ſentence, but the determination and ſentence of *the law*; and, in ſhort, it is the remedy preſcribed by law for the redreſs of injuries; and the ſuit or action is the vehicle or means of adminiſtering it. What that remedy may be, is, indeed, the reſult of deliberation and ſtudy to point out; and therefore the ſtile of the judgment is, not that it is decreed or reſolved by the court, for then the judgment might appear to be their own; but "it is conſidered," *conſideratum eſt per curiam*, that the plaintiff do recover his damages, his debt, his poſſeſſion, and the like; which implies, that the judgment is none of their own; but the act of law, pronounced and declared by the court, after due deliberation and enquiry. All theſe ſpecies of judgments are either *interlocutory* or *final*. For the former, ſee INTERLOCUTORY. *Final* judgments are ſuch as at once put an end to the action, by declaring that the plaintiff has either entitled himſelf, or has not, to recover the remedy for which he ſues. In which caſe, if the judgment be for the plaintiff, it is alſo conſidered, that the defendant be either amerced, for his wilful delay of juſtice in not immediately obeying the king's writ by rendering the plaintiff his due (8 Rep. 40. 61.); or be taken up, *capiatur*, till he pays a fine to the king for the public miſdemeanor, which is coupled with the private injury, in all caſes of force (8 Rep. 59. 11 Rep. 43. 5 Mod. 285.), of falſhood in denying his own deed, (F. N. B. 121. Co. Litt. 131. 8 Rep. 60. 1 Roll. Abr. 219. Lill. Entr. 379. C. B. *Hil.* 4 Ann. Rot. 430.) or unjuſtly claiming property in replevin, or of contempt by diſobeying the command of the king's writ or the expreſs prohibition of any ſtatute. (8 Rep. 60.) But now, in caſe of treſpaſs, ejectment, aſſault, and falſe impriſonment, it is provided by the ſtatute 5 & 6 W. & M. c. 12., that no writ of *capias* ſhall iſſue for this fine, nor any fine be paid; but the plaintiff ſhall pay 6*s*. 8*d*. to the proper officer, and be allowed it againſt the defendant among his other coſts. And therefore upon ſuch judgments, in the common pleas, they uſed to enter that the fine was remitted, and now in both courts they take no notice of any fine or *capias* at all. (Salk. 54. Carth. 390.) But if judgment be for the defendant, then in caſe of fraud and deceit to the court, or malicious or vexatious ſuits, the plaintiff may alſo be fined (8 Rep. 59, 60.); but in moſt caſes it is only conſidered, that he and his pledges of proſecuting be (nominally) amerced for his falſe claim, *pro falſo clamore ſuo*, and that the defendant may go thereof without a day, *eat inde ſine die*, that is, without any further continuance or adjournment; the king's writ, commanding his attendance, being now fully ſatisfied, and his innocence publicly cleared. To judgments coſts are a neceſſary appendage. See COSTS. Blackſt. Com. book iii.

In every judgment there ought to be three perſons, *actor*, *reus*, and *judex*; plaintiff or proſecutor, defendant, and judge.

Judgment may be given not only upon the trial of the iſſue, but on a default, confeſſion, demurrer, or an outlawry, which is a judgment in itſelf. After iſſue joined in a cauſe, the plaintiff may, if he thinks proper, accept of a judgment from the defendant; but on ſuch a judgment, a writ of error may be had without putting in bail, which cannot be done on a judgment after verdict. All judgments given in courts of record muſt be entered; in order to which the plaintiff's attorney, four days after the record is brought into court, may, if the judgment is out, enter judgment by the uſual courſe of the court; but he cannot do this ſooner, becauſe the defendant muſt have time to bring in a writ of error, or to find out matter for an arreſt of judgment. The defendant may oblige the plaintiff to enter his judgment, in order that he may plead it to any other action; and judgment upon a demurrer to a declaration, &c. which does not paſs upon the merits of the cauſe, is no bar to it, though other judgments may be pleaded in bar to any action brought again for the ſame thing. Judgments are to continue till they are reverſed; but an action of debt will lie on a good judgment, as well after a writ of error is brought, as before it. If a plaintiff does not take out an execution within a year and a day after judgment is obtained, the judgment muſt be revived by a *ſcire facias*.

JUDGMENT *for Crimes*, ſucceeds trial and conviction, in ſuch crimes and miſdemeanors as are either too high, or too low, to be included within the benefit of clergy. For when, upon a capital charge, the jury have brought in their verdict guilty, in the preſence of the priſoner; he is either immediately, or at a convenient time ſoon after, aſked by the court, if he has any thing to offer, why judgment ſhould not be awarded againſt him. And in caſe the defendant be found guilty of a miſdemeanor, (the trial of which may, and does uſually, happen in his abſence, after he has once appeared,) a *capias* is awarded and iſſued, to bring him in to receive his judgment; and, if he abſconds, he may be proſecuted even to outlawry. (See ARREST *of Judgment*.) When all reſources fail, the court muſt pronounce that judgment, which the law hath annexed to the crime. Judgment, in caſe of treaſon or felony, muſt be by an expreſs ſentence, an outlawry, or abjuration; and no judgment can be inflicted contrary to law, or that is not appointed by act of parliament. Theſe judgments are of very different kinds, ſome are capital, extending to the life of the offender, and conſiſting generally in being hanged by the neck till dead; though in very atrocious crimes other circumſtances of terror, pain, or diſgrace, are ſuperadded; as in treaſons of all kinds, the offender is ſentenced to be drawn or dragged to the place of execution; in high treaſon affecting the king's perſon or government, embowelling alive, beheading, and quartering; and in murder, a public diſſection. In caſe of any treaſon committed by a female, the judgment is to be burned alive. But the humanity of the Engliſh nation has authorized, by a tacit conſent, an almoſt general mitigation of ſuch part of theſe judgments as favour of torture or cruelty; a ſledge or hurdle being uſually allowed to ſuch traitors as are condemned to be drawn; and there being few inſtances (and thoſe accidental or by negligence) of any perſon's being embowelled or burned, till previouſly deprived of ſenſation by ſtrangling. (See EXECUTION *of Criminals*.) Some puniſhments conſiſt in exile or baniſhment, by abjuration of the realm, or tranſportation; others in loſs of liberty, by perpetual or temporary impriſonment. Some extend to confiſcation, by forfeiture of lands, or moveables, or both, or of the profits of land for life; others induce a diſability of holding offices or employments, being heirs, executors, and the like. Some, though rarely, occaſion a mutilation, or diſmembering, by cutting off the hand, or ears; others fix a laſting ſtigma on the offender, by ſlitting the noſtrils; or branding in the hand or cheek. Some are merely pecuniary, by ſtated, or diſcretionary fines; and laſtly there are others, that conſiſt principally in their ignominy, though moſt of them are mixed with ſome degree of corporal pain; and theſe are inflicted chiefly for ſuch crimes, as either ariſe from indigence, or render even opulence diſgraceful. Such are whipping, hard labour in the houſe of correction or otherwiſe, the pillory, the ſtocks, and the ducking ſtool. Blackſt. Com. book iv.

JUDGMENTS *for Debts* are acknowledged by a perſon's giving a general warrant of attorney to any attorney of the court in which it is to be acknowledged, to appear for him at the ſuit of the party to whom the ſame is to be done, and to file common bail, receive a declaration, and then to plead, *non ſum informatus,* I am not informed; or to let it paſs by *nihil dicit,* he ſays nothing; upon which judgment is entered for want of a plea. Judges that ſign judgment of lands, are to ſet down the day of the month and year in which they do it; and they ſhall be good againſt purchaſers only from ſuch ſigning. Where a perſon has acknowledged a judgment for the ſecurity of money, and afterwards, on borrowing more money of another perſon, mortgages his lands, &c. without giving any notice of the judgment to the mortgagee; in ſuch caſe, if the mortgager do not within ſix months pay off and diſcharge the judgment, he ſhall forfeit his equity of redemption, 4 and 5 Will. and Mary. Acknowledging a judgment in the name of another perſon, without his privity or conſent, is made felony by 21 Jac. I. c. 26.

JUDGMENT, *Action of Debt on,* lies for a perſon who hath once obtained a judgment againſt another for a certain ſum, and who has neglected to take out execution upon it; ſuch perſon, in his freſh action, ſhall not be put upon the proof of the original cauſe of action; but, after ſhewing the judgment once obtained, ſtill in full force, and yet unſatisfied, the law immediately implies, that by the original contract of ſociety the defendant hath contracted a debt, and is bound to pay it. This method ſeems to have been invented when real actions were more in uſe than at preſent, and damages were permitted to be recovered thereon; in order to have the benefit of a writ of *capias* to take the defendant's body in execution for theſe damages, which proceſs was allowable in an action of debt (in conſequence of the ſtatute 25 Edw. III. c. 17.), but not in actions real. Wherefore, ſince the diſuſe of theſe real actions, actions of debt upon judgment in perſonal ſuits have been partly much diſcountenanced by the courts, as being generally vexatious and oppreſſive, by haraſſing the defendant with the coſts of two actions inſtead of one. Blackſt. Com. b. iii.

JUDGMENT, *Arreſt of.* See ARREST.

JUDGMENT, *Aſſigning falſe.* See ASSIGN.

JUDGMENT *of God.* See JUDICIUM *Dei.*

JUDGMENT, *Execution of.* See EXECUTION, &c.

JUDGMENT, *Maſs of.* See MASS.

JUDGMENT, *Property by.* A judgment, in conſequence of ſome ſuit or action in a court of juſtice, is frequently the means of veſting the right and property of chattel intereſts in the prevailing party. In this caſe we muſt diſtinguiſh between property, the *right* of which is before veſted in the party, and of which only *poſſeſſion* is recovered by ſuit or action; and property, to which a man before had no determinate title or certain claim, but he gains as well the right as the poſſeſſion by the proceſs and judgment of the law. Of the former ſort are all debts and choſes in action; as if a man gives bond for 20*l.*, or agrees to buy a horſe at a ſtated ſum, or takes up goods of a tradeſman upon an implied contract to pay as much as they are reaſonably worth; in all theſe caſes the right accrues to the creditor, and is completely veſted in him at the time of the bond being ſealed, or the contract or agreement made; and the law only gives him a remedy to recover the poſſeſſion of that right, which already in juſtice belongs to him. But there is alſo a ſpecies of property, in which a man has not any claim or title whatſoever, till after ſuit commenced and judgment obtained in a court of law; where the right and the remedy do not follow each other, as in common caſes, but accrue at one and the ſame time; and where, before judgment had, no man can ſay that he has any abſolute property, either in poſſeſſion or in action. Of this nature are ſuch penalties as are given by particular ſtatutes, to be recovered on an action *popular*; or, in other words, to be recovered by him or them who will ſue for the ſame; in which caſe a ſuit and judgment at law are not only the means of recovering, but alſo of acquiring property. Another ſpecies of property, that is acquired and loſt by ſuit and judgment at law, is that of *damages* given to a man by a jury, as a compenſation and ſatisfaction for ſome injury ſuſtained; as for a battery, for impriſonment, for ſlander, or for treſpaſs. Here the plaintiff has no certain demand till after verdict; but when the jury has aſſeſſed his damages, and judgment is given thereupon, whether they amount to 20*l.* or 20*s.*, he inſtantly acquires, and the defendant loſes at the ſame time a right to that ſpecific ſum. To this kind of property may alſo be referred all title to coſts and expences of ſuit.

JUDGMENT, *Villainous.* See VILLAINOUS.

JUDICATURE, the quality or profeſſion of thoſe who adminiſter juſtice.

In which ſenſe judicature is a kind of prieſthood. In France, officers of judicature are venal.

JUDICATURE is alſo uſed to ſignify the extent of the juriſdiction of the judge, and the court wherein he ſits to render juſtice.

JUDICE—*Coram non Judice.* See CORAM.

JUDICIAL. See EXTRAJUDICIAL.

JUDICIAL *Aſtrology.* See ASTROLOGY.

JUDICIAL *Oratory.* See ORATORY.

JUDICIAL *Writs.* See WRIT.

JUDICIALIS LEX. See LEX.

JUDICIARY ASTROLOGY. See ASTROLOGY.

JUDICIARY *Depoſit.* See DEPOSIT.

JUDICIO FALSO. See FALSO.

JUDICIUM ASSISÆ. See ASSIZE.

JUDICIUM *Crucis.* See *Judgment of the* CROSS.

JUDICIUM *Dei, Judgment of God,* was a term anciently applied to all extraordinary trials of ſecret crimes; as thoſe by arms and ſingle combat, and the ordeals; or thoſe by fire, or red-hot plough-ſhares; by plunging the arm in boiling water, or the whole body in cold water; in hopes God would work a miracle rather than ſuffer truth and innocence to periſh.

"Si ſuper defendere non poſſit, judicio Dei, ſcil. aqua vel ferro, fieret de eo juſtitia."

Theſe cuſtoms were a long time kept up, even among Chriſtians; and they are ſtill in uſe in ſome nations. See ORDEAL, WATER, COMBAT, DUEL, and CHAMPION.

Trials of this ſort were uſually held in churches, in preſence of the biſhops, prieſts, and ſecular judges; after three days faſting, confeſſion, communion, and many adjurations and ceremonies, deſcribed at large by Du Cange.

JUDICIUM *Parium* denotes a trial by a man's equals, *i. e.* of peers by peers, and of commoners by commoners. In magna charta it is more than once inſiſted on as the principal bulwark of our liberties, but eſpecially by chap. 29, that no freeman ſhall be hurt in either his perſon or property, "niſi per legale judicium parium ſuorum vel per legem terræ." And this was ever eſteemed, in all countries, a privilege of the higheſt and moſt beneficial nature.

JUDITH, an apocryphal book, excluded by the Jews from the canon of the Old Teſtament, and ſo called, becauſe Judith is the principal perſon to whoſe hiſtory the book refers. We ſhall firſt give a ſummary of the contents of this book, and then inquire into the time in which it was written, and ſtate different opinions concerning the writer of it. Nebuchodonoſor, king of the Aſſyrians, who reigned in Nineveh, having defeated Arphaxad, king of the Medes, and taken him priſoner, formed a deſign of extending his conqueſts, and for this purpoſe ſent Holofernes with a powerful army, who became maſter of Meſopotamia, Syria, Lybia, and Cilicia. After theſe conqueſts, he took poſſeſſion of Idumæa. Upon this the Iſraelites were alarmed, and taking poſſeſſion of the hilly country, fortified their cities. The high prieſt, Joachim, or Eliakim, encouraged their exertions, and ordered them to confide in God, and to implore his ſuccour. Holofernes expreſſed ſurpriſe at their vigorous preparations for reſiſtance againſt his powerful army, and enquired of their neighbours, the Moabites and Ammonites, what force they could command, and what was the reaſon of their declining to ſubmit to him. Achior, the chief of the Ammonites, informs him, that theſe people were ſometimes protected, and ſometimes forſaken by their God; adding, that if they had offended their God, he would deliver them into his hands; but if not, then God would defend them, and his whole army could not conquer them. Holofernes received this account with indignation, and ordered Achior to be carried to Bethulia, which he immediately beſieged, intending to revenge himſelf of Achior, as ſoon as he had taken that place. Onias, the governor of Bethulia, made preparations for its defence; but the inhabitants, dreading the event of a prolonged ſiege, wiſhed to ſurrender the place, and could ſcarcely be induced to continue their reſiſtance for five days. It was in theſe critical circumſtances, that Judith, ſaid to be of the tribe of Reuben, daughter of Merari, and widow of Manaſſeh, both opulent and beautiful, reſolved upon going into the camp of Holofernes, in order to deſtroy him. Accordingly ſhe left the city, and was introduced to Holofernes. The conqueror was captivated by the charms of her perſon, entertained her with a ſumptuous feaſt, and expecting to obtain a complete triumph over this beautiful and rich widow, indulged in drinking to exceſs. In the evening, Bagoas, the eunuch of Holofernes, who had introduced Judith, with her maid-ſervant, to the feaſt, ſhut up the chamber-doors and departed. Holofernes, overcome by the wine which he had drank, fell into a ſound ſleep. Judith availed herſelf of the opportunity, cut off the head of Holofernes with his own ſabre, depoſited it in her maid's bag, and taking advantage of the liberty that was allowed her to viſit and leave the camp at pleaſure, haſtened back to Bethulia. When the head of Holofernes was diſplayed to view on the walls of the city, the beſieging army of the Aſſyrians was ſeized with diſmay, and fled in great diſorder. The Iſraelites purſued them, killed many of them, and took poſſeſſion of a very large ſpoil. Judith took occaſion to ſing a hymn to the Lord, to whom ſhe conſecrated the arms of Holofernes, and accompanied the people to Jeruſalem to preſent their public thankſgiving for this ſignal deliverance. She returned afterwards to Bethulia, lived there to the advanced age of 105 years, and was buried with her huſband in this city. The people lamented her death for ſeven days; and the day on which this victory was obtained was reckoned by the Hebrews among their feſtivals.

The greateſt difficulty in this narration is to fix the time, when the event, which it records, happened. Some place it before, others after the captivity; and ſome finding inſuperable difficulties in reconciling it with the hiſtory of the Jews, Aſſyrians, and Medes, have maintained, that it is only a parable and allegory, and not a true hiſtory. The Greek and Syriac verſions ſeem to prove, that it occurred after the captivity of Babylon. The Vulgate may be explained as referring to the time preceding the captivity. Neither ſacred nor profane hiſtory, in the time of Manaſſeh, or in that of Zedekiah, either before or after the captivity, ſay any thing of a king of Nineveh, named Nebuchodonoſor, who in the 12th and 17th years of his reign conquered a king of the Medes, called Arphaxad. It would alſo be hard to find at this particular time an high-prieſt of the Jews, whoſe name was Joachim or Eliakim. We ſhould likewiſe meet with invincible difficulties, in reconciling the Greek text and the Syriac with the Latin of St. Jerom; nor would there be perhaps leſs, if we were to adhere only to the Vulgate, and reject the Greek, Syriac, and old Italic verſions. If the names were granted, it is not eaſy to determine whether we ſhould adopt the Greek or the Latin text. As to the Syriac, it was taken from the Greek, and from the Greek only one might infer, that the ſtory of Judith was tranſlated and written after the captivity; but if we follow the Latin, it may be placed before the captivity. The Greek text is very ancient: ſome ſuppoſe it to be Theodotion's, who lived under Commodus, after A.D. 180; but it muſt be more ancient, becauſe it is cited by Clemens Romanus in his epiſtle to the Corinthians, written above 120 years before. The Syriac likewiſe is very ancient, and tranſlated from ſome Greek text more correct than any we have at preſent; but the ſame as to ſubſtance. The Latin Italic verſion, or the old Vulgate, is made likewiſe from the Greek, but it is very defective. St. Jerom's Vulgate was tranſlated from a Chaldee text, which St. Jerom took to be the genuine original of Judith; but he leaves the ſubject in a very perplexed and unſatisfactory ſtate. With the old Latin verſion before him, he omitted what was ſuperfluous; and reſerved all that was found agreeing with the Chaldee, and probably added what was wanting, ſo that his verſion is rather a reform of the old, than a tranſlation altogether new; and ſome words are obſerved in it which are taken from the old Italic. They who maintain, that the hiſtory of Judith contained what paſſed before the captivity, and in Manaſſeh's time, believe it ſufficient to demonſtrate, that there is nothing in the hiſtory repugnant to this aſſertion. The opinion, which places the hiſtory of Judith after the captivity of Babylon, is founded principally on the authority of the Greek verſion, which is certainly, as we have already ſaid, very ancient; and it may paſs for an original, there being nothing more ancient and authentic; for it is dubious, whether St. Jerom's Chaldee were the original text of this work. After all, what ſeems demonſtrative for the opinion, which places this after the return from the Babyloniſh captivity, is the import of the Greek, chap. iv. 2. In this opinion almoſt all the ancients, and many of the moderns, have concurred. Euſebius places it in the reign of Cambyſes, Syncellus in that of Xerxes, Sulpitius Severus in that of Ochus; others under Antiochus Epiphanes, and in the time of the Maccabees.

Dr. Prideaux ſuppoſes, that the Nebuchodonoſor of the book of Judith is Saoſduchinus, king of Babylon, who commenced his reign in the 31ſt year of Manaſſeh, and that Arphaxad is Deioces, king of Media ; and that the deſtruction of Holofernes and his army at Bethulia took place in the 44th year of Manaſſeh, B.C. 655. He further ſuppoſes, on the authority of St. Jerom, that this book was originally written in the Chaldee language, and tranſlated by Jerom into the Latin tongue, which is the tranſlation that is now extant in the vulgar Latin edition of the Bible. The Engliſh tranſlation, which we at preſent have among the apocryphal writings in our Bible, as well as the Syriac, was made from the Greek.

Whether the book of Judith be authentic and canonical is a point that has been very much diſputed. The Jews read it in St. Jerom's time ; St. Clement hath cited it in epiſt. 1. ad Corinth., as well as the apoſtolical conſtitutions, Clemens Alexandrinus, Origen, Tertullian, St. Ambroſe, and St. Jerom. Jerom ſays, in his preface to the book of Judith, that the council of Nice received it among the canonical books, though no canon was made to approve it. St. Athanaſius, or the author of the Synopſis, gives a ſummary account of it. St. Auſtin, and the whole African church, received it. Pope Innocent I., and pope Gelaſius, acknowledged it. The council of Trent hath alſo confirmed this book. The Romaniſts of courſe, having received this book into the canon of divine writ, hold the hiſtory recorded in it to be true. On the other hand, it is the opinion of Grotius, that it is wholly a parabolical fiction, written in the time of Antiochus Epiphanes, when he came into Judea to raiſe a perſecution againſt the Jewiſh church ; and that the deſign of it was, to confirm the Jews under that perſecution, in their hopes that God would ſend them a deliverance : accordingly " by Judith is meant Judea ; by Bethulia the temple or houſe of God ; and by the ſword which went out from thence, the prayers of the ſaints ; that Nebuchodonoſor doth there denote the devil, and the kingdom of Aſſyria, the devil's kingdom, pride ; that by Holofernes is there meant the inſtrument or agent of the devil in that perſecution, Antiochus Epiphanes, who made himſelf maſter of Judea, that fair widow, ſo called, becauſe deſtitute of relief ; that Eliakim ſignifies God, who would ariſe in her defence, and at length cut off that inſtrument of the devil who would have corrupted her." Many learned writers among the Proteſtants, though they do not adopt the peculiar fancy of this great man, agree with him in the general, that this book is rather a parabolical than a real hiſtory, deſigned for the inſtruction and comfort of the Jews under that figure, and not to give them a narrative of any thing that was really done ; and their reaſon is, that they think it utterly inconſiſtent with all times, where it hath been endeavoured to be placed, either before or after the captivity of the Jews. Dr. Prideaux thinks that by putting it in the time of Manaſſeh he removes all the objections which are alleged to prove its inconſiſtency with the times after the captivity, which he thinks are unanſwerable.

After examining a variety of objections relating to this book and its hiſtory, Dr. Prideaux concludes, " that if any one will ſtill contend, that it is only a religious romance, and not a true hiſtory ; that, according to the intention of the author, the ſcene of it was put under the reign of Xerxes, when Joakim, the ſon of Joſhua, was high-prieſt, and the civil government of Judea, as well as the eccleſiaſtical, was in the hands of that officer : and that the inconſiſtency of ſo many particulars in that book, with the ſtate and tranſactions of thoſe times, was only from the ignorance of the author in the hiſtory of the ſaid times, and his unſkilfulneſs in placing the ſcene of his hiſtory in them ; I ſay, if any will inſiſt on all this, notwithſtanding what is above ſaid, I ſhall not enter into any controverſy with him about it : only thus much I muſt inſiſt on, that if it be a true hiſtory (which I am inclined moſt to think, though I will not be poſitive in it), it can fall no where elſe but in the time where I have laid it."

The author of the book of Judith is unknown. St. Jerom ſeems to think that it was written by Judith herſelf ; others imagine, that the high-prieſt Joachim or Eliakim, mentioned in this book, was the author : but all this is mere conjecture. Thoſe who believe that the hiſtory of Judith happened in the time of Cambyſes, and after the captivity of Babylon, ſuppoſe that Joſhua, the ſon of Joſedek, then high-prieſt, wrote it. The author, whoever he was, does not appear to have been contemporary with the tranſactions. He ſays, that Achior's family was ſtill in his time ſubſiſting in Iſrael, Judith, xiv. 6. and that the feſtival inſtituted in memory of Judith's victory was ſtill celebrated, Judith, xvi. 31. Dupin on the Canon. Prideaux's Conn. v. 1. Calmet.

JUDOIGNE, in *Geography*. See JODOIGNE.

JUDOMA, a river of Ruſſia, in the government of Irkutſk, which joins the Maia, N. lat. 58° 50'. E. long. 134° 14'.

JUDOOK, a town of Bengal ; 18 miles N. of Dacca.

JUDOSA BAY, a bay of Louiſiana, which lies in the N.W. corner of the gulf of Mexico ; connected by a chain of iſlands towards the S.W. with St. Bernard's bay.

JUEFRAS, a town of Africa, in the kingdom of Barra.

IVEL RIVER, in Bedfordſhire, is navigable from Temsford to the town of Biggleſwade : it does not appear, that any ſteps have yet been taken for extending this navigation up to Shefford, agreeably to the act for that purpoſe, which paſſed in the 30th year of Geo. II. : the private intereſts of the merchants of Biggleſwade ſeem a more effectual bar to the completion of this object, than the want of money, which has been ſo often inſiſted on.

IVELCHESTER *and* LANGPORT CANAL, is the parliamentary name of an inland navigation in Somerſetſhire, about ſeven miles long, from the Parret river, near Langport, to the town of Ilcheſter, made in purſuance of the act obtained in the year 1795. See CANAL.

IVENACK, a town of the duchy of Mecklenburg ; 30 miles S.E. of Roſtock.

IVERAGH. See KERRY.

IVERSKOI, a town of Ruſſia, in the government of Novgorod ; 80 miles S.E. of Novgorod.

IVES, SIMON, in *Biography*, was a lay vicar of St. Paul's cathedral, till driven thence by the republicans ; when he became a ſinging-maſter, and a teacher of muſic in private families.

During the reign of Charles I., Ives ſtood high as a compoſer, as we are told in the MS. account of the maſque intitled " The Triumphs of Peace," written by Shirley, a dramatiſt of the ſecond claſs, which was acted at Whitehall in 1633, and the whole expence of the proceſſion defrayed by the gentlemen of the four inns of court, as a teſtimony of duty and loyalty on his majeſty's return from Scotland, after terminating the diſcontents of that kingdom.

A very circumſtantial account of this maſque by the lord commiſſioner Whitelocke, in his own hand-writing, has been preſerved. It was the property of the late Dr. Morton of the Britiſh Muſeum. In this narrative, the commiſſioner, who was the principal manager of the exhibition, ſays : " I made choyce of Mr. Simon Ives, an honeſt and able muſitian,

ſitian, of excellent ſkill in his art, and of Mr. Lawes, to compoſe the aiers, leſſons, and ſongs for the maſque, and to be maſters of all the muſicke under me."

The compoſitions of Simon Ives are not devoid of merit; ſome of his rounds and catches, publiſhed in Hilton's collection, ſtill live; "Come honeſt friends and jovial boys," &c.

In Playford's Muſical Companion, and among the "Ayres and Dialogues" publiſhed in his time, there are ſeveral ſongs ſet by Ives, who died in 1662, in the pariſh of Chriſtchurch, London.

Ives, *St.*, in *Geography*, is a populous borough, market and ſea-port town, in the hundred of Penwith and county of Cornwall, England. It is ſituated near the north-eaſt angle of a fine bay, which is bounded by bold rocks of black killas. The church is a low, but ſpacious building, having a nave and two aiſles: from its ſituation near the ſhore, it is frequently covered, at high tides and tempeſts, with the ſpray of the ſea. The chief articles exported from this town are ſlate and pilchards. The latter are in moſt ſeaſons taken in the bay in great abundance; and at the time of large draughts, it is uſual for all the inhabitants to contribute their aſſiſtance: the ſhops are then deſerted; and if it ſhould be Sunday, even the church is likewiſe abandoned. This port, as well as moſt others on the north coaſt, is greatly incommoded by the ſhoals of ſand driven in by the north-weſt winds: and the town, as appears from Leland, has alſo ſuffered from the ſame cauſe. In the reign of queen Mary, St. Ives was governed by a portreve and burgeſſes; but was not incorporated till the ſixteenth year of Charles I., who confirmed ſome former privileges, veſted the future government of the town in a mayor, recorder, twelve capital and twenty-four inferior burgeſſes, and granted the inhabitants four annual fairs, two weekly markets, Wedneſday and Saturday, and alſo endowed a grammar ſchool. Two members are returned to parliament from this borough: the right of election is poſſeſſed by the corporation, and all the inhabitants paying ſcot and lot; the number of voters being about 180. St. Ives is diſtant from London 275 miles: the number of houſes was eſtimated, under the population act of 1800, as 540, inhabited by 2714 perſons. Beauties of England and Wales, vol. ii. Polwhele's Hiſtory, &c. of Cornwall.

Ives, *St.*, a market town and pariſh in the hundred of Hurſtingſtone, Huntingdonſhire, England, is ſituated on the banks of the river Ouſe. It was called, in the Saxon times, Slepe, and is mentioned by that appellation in the Domeſday book: but it afterwards obtained the name of St. Ives from Ivo, a Perſian archbiſhop, who is reported to have travelled through England, preaching the goſpel, about the year 600. On the ſpot where the remains of this ſaint were reported to have been found, abbot Ednoth built a church; and ſoon afterwards, anno 1017, a priory was erected by earl Adelmar, who brought hither ſome Benedictine monks from the abbey of Ramſey. After the diſſolution of monaſteries, the ſcite of this priory was granted, 36 Henry VIII., to ſir Thomas Audley. The priory, barn, and dove-houſe are yet ſtanding, but do not exhibit any thing worthy of notice. The pariſh church is a neat edifice; its ſpire has been twice blown down. The other places for religious worſhip in this town are, two meetings for Baptiſts, one for Quakers, and one for Preſbyterians: the latter had its riſe at the period of the civil wars of the ſeventeenth century, when the ejected miniſter of St. Ives was ſupported by the inhabitants in oppoſition to the reigning powers. Great part of the town was deſtroyed by a fire on the 30th of April 1689: it began in a malt-houſe at the end of White-hart-lane; and laid in aſhes the dwellings and property of upwards of an hundred families. The lower part of the town, from its vicinity to the river Ouſe, has been frequently overflowed. Over the river is a ſtone bridge, with four pointed, and two ſemicircular arches. The charter for the market was granted by king Edward I. about the year 1290: it is held on Mondays, and is one of the largeſt in the kingdom for cattle, ſheep, pigs, and poultry; being conſidered as ſecond only to that of Smithfield in London. Here are alſo two well frequented fairs, held annually, at Michaelmas and Whitſuntide: the former ſprung from an annual meeting appointed in 1020, to be held on the feaſt of St. Michael; the latter was granted by a charter of Henry I., dated in 1110, and was privileged to continue from "Whit-Monday till the Monday following, and all that day." Several breweries and malt-kilns are eſtabliſhed in the town: the inns and public-houſes are numerous. Many charitable donations are recorded on two tablets in the church, but the gifts are not large. St. Ives is 60 miles diſtant from London: the population, as returned under the act of 1801, amounted to 2099, inhabiting 478 houſes. In the pits in the neighbourhood of this town, the cornua ammonis, belemnites, and other foſſils, are occaſionally found. Beauties of England and Wales, vol. vii.

IVETEAUX, Nicholas Vauquelin, in *Biography*, celebrated as a French poet, was born at Freſnaye, near Falaiſe, about the year 1559. His father, Vauquelin de la Freſnaye, was eminent for his poetry, and had the office of lieutenant-general of the bailiwick of Caen, which he readily made over to his ſon, but he was ill adapted to the duties of the ſituation, and after another change or two he was appointed preceptor to the duke of Vendome, natural ſon of Henry IV. He was next engaged in the ſame buſineſs with regard to the dauphin, afterwards Louis XIII., but not giving ſatisfaction, he was diſcharged with a penſion and two abbacies. Theſe, on account of ſome irregularities, he was obliged to reſign, and then retired to a good houſe in the Fauxbourg St. Germain, where he adopted an epicurean life: after this he retired to a country ſeat in the dioceſe of Meaux, where he died, in 1649, at the age of ninety. The works by which he is known are "Inſtitution d'un Prince," a poem written with force and ſolidity, and containing excellent leſſons of morality: and "Stanzas, Sonnets, and other Poems." Moreri.

JUFFERS, among *Carpenters*, a term uſed for pieces of wood about four or five inches ſquare, and of ſeveral lengths.

JUFOSTA, in *Geography*, a town of Arabia, in the province of Oman; 160 miles E.S E. of El-Catif.

JUG, an earthen pot or pitcher to hold drink; alſo a term uſed in many parts for a common, paſture, or meadow.

JUGANG, in *Geography*, a town of Thibet; 30 miles E.N.E. of Zuenga.

JUGDALLIK, a town of Candahar, on the Kameh; 35 miles E.S.E. of Cabul.

JUGDEES, a town of Hindooſtan, in Oude; 31 miles N.E. of Allahabad.

JUGDISPOUR, a town of Hindooſtan, in Bahar; 15 miles S.W. of Arrah. N. lat. 25° 27′. E. long. 83° 36′.—Alſo, a town of Hindooſtan, in Bahar; 8 miles S. of Bettiah. N. lat. 26° 39′. E. long. 84° 51′.—Alſo, a town of Hindooſtan, in Oude; 44 miles N. of Manickpour.—Alſo, a town of Hindooſtan, in Oude; 46 miles W.S.W. of Kairabad.

JUGERUM, a Roman meaſure, the double of the actus quadratus. It was a ſquare of 120 Roman feet. The jugerum was divided into 12 unciæ, and the unciæ into 24 ſcrupulæ. Its proportion to the Engliſh acre is as 10,000 to 16,097.

JUGHIGOPA, in *Geography*, a town of Bengal; 27 miles E. of Rangamutty.

JUGK, a town of Pruſſia, in the province of Natangen; 10 miles N.W. of Lick.

JUGLANS, in *Botany*, ſo called by the Roman writers, on account of the excellence of the nut. It is contracted from *Jovis glans,* the acorn or maſt of Jove.—Walnut-tree, Linn. Gen. 496. Schreb. 645. Willd. Sp. Pl. v. 4. 455. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 360. Juſſ. 375. Lamarck. Dict. v. 4. 500. Illuſtr. t. 781. Gærtn. t. 89. (Nux; Tournef. t. 346.) Claſs and order, *Monœcia Polyandria.* Nat. Ord. *Amentaceæ,* Linn. *Terebintaceæ,* Juſſ.

Gen. Ch. Male, *Cal.* Perianth elliptical, flat, divided into ſix, depreſſed, concave, obtuſe ſegments. *Cor.* none. *Stam.* Filaments from eighteen to twenty-four, very ſhort; anthers oval.—Female, *Cal.* Perianth of one leaf, bell-ſhaped, four-cleft, erect, very ſhort, ſingle-flowered. *Cor.* of one petal, four-cleft, erect, acute, a little longer than the calyx. *Piſt.* Germen inferior, oval, large; ſtyle very ſhort; ſtigmas two, reflexed, jagged at the extremity. *Peric.* Drupa dry, oval, large, of one cell. *Seed.* Nut large, roundiſh, reticulated with furrows; kernel four-lobed, variouſly furrowed.

Eſſ. Ch. Male, Calyx depreſſed, ſix-lobed. Corolla none. Stamens about twenty. Female, Calyx four-cleft, ſuperior. Corolla four-cleft. Styles two. Drupa with a furrowed lobed kernel.

1. J. *regia.* Common Walnut-tree.—Linn. Sp. Pl. 1415. Mill. Illuſtr. t. 81.—Leaflets about nine, oval, ſmooth, ſlightly ſerrated, equal. Fruit globoſe.—A native of Perſia, and alſo of the northern parts of China. It flowers in the ſpring, and bears fruit in autumn. A large and handſome *tree,* with ſtrong ſpreading boughs. *Leaves* pinnate, extremely fragrant; the end leaflet ſtanding on a foot-ſtalk. *Male-flowers* in a cloſe, pendulous ſpike. *Females* ſcattered, frequently two or three together.—*Fruit* an ovate, ſmooth nut, containing a white, delicious, oily kernel, whoſe ſurface is rugged, and covered with a tough, yellowiſh ſkin.—The walnut-tree is univerſally known and admired for the ſplendour of its foliage, the delicacy of its fruit, and the utility of its wood.—There are many varieties of the ſpecies in queſtion, well known to cultivators. It was formerly more propagated in Britain than at preſent, for its wood, which was in very great eſteem, till the introduction of mahogany ſomewhat ſuperſeded its uſe, but is ſtill in great requeſt for furniture in various parts of the continent; with us it is valued chiefly for gun-ſtocks, the demand for which, of late years, has cauſed great devaſtation among our walnut-trees, a circumſtance worthy the attention of perſons who make planting an object either of pleaſure or profit. The unripe fruit is frequently converted into a pickle or preſerve.

2. *J. alba.* The Hickery, or White Walnut-tree.—Linn. Sp. Pl. 1415.—Leaflets ſeven, oblong-lanceolate, pointed, ſerrated, pubeſcent underneath; the odd one ſeſſile. Fruit nearly quadrangular, ſmooth.—Native of North America.—*Leaves* compoſed of two or three pairs of oblong leaflets, terminated by an odd one, which is ſeſſile. *Fruit* ſhaped ſomewhat like a common walnut, but the ſhell is not furrowed, does not ſplit aſunder, and is of a lighter colour.—Cateſby deſcribes this as a very large tree, with a trunk two or three feet in diameter, the leaves differing from the laſt not only in being ſerrated, but narrower, and more pointed. The ſhell is ſo very hard that it cannot eaſily be broken. The kernel is ſweet and well-taſted, affording a wholeſome and pleaſant oil.

3. *J. nigra.* Black Walnut-tree.—Linn. Sp. Pl. 1415. Jacq. Ic. Rar. t. 191.—Leaflets about fifteen, oblong-lanceolate, ſerrated. Fruit globular, roughiſh, dotted.—Found from Pennſylvania to Florida. It flowers in April and May. This is alſo a large *tree.* *Leaves* compoſed of ſix or ſeven pairs of leaflets, which are acute and ſerrated, emitting a ſtrong aromatic flavour. Outer cover of the *nuts* rough; theſe are rounder than the common walnut. *Shell* hard and thick; kernel very ſweet. The wood is the moſt valuable of all walnut-trees, being very finely veined, and capable of receiving a high degree of poliſh. There were large trees of the Black Walnut in Chelſea garden in 1759, which had produced abundance of fruit for upwards of forty years.

There are ſeveral other ſpecies of *Juglans,* chiefly, if not entirely, natives of America, all remarkable for the excellence of their wood. Willdenow enumerates eleven—profeſſor Martyn eight.

Of theſe *J. cinerea,* the Aſh-coloured Walnut, Jacq. Ic. Rar. t. 192. and *J. baccata,* the pulpy-coated walnut, figured in Sloane's Jamaica, t. 157. f. 1, are the only remaining Linnæan ones. Of the genus of the latter we preſume there muſt be conſiderable doubt.

Juglans, in *Gardening,* compriſes plants of the deciduous, hardy tree kind, of which the ſpecies moſtly cultivated are, the common walnut-tree (J. regia); the white walnut-tree (J. alba); and the black walnut-tree (J. nigra).

It is remarked of the firſt ſort by Martyn, that, as "they all vary again when raiſed from the ſeed, and that as nuts from the ſame tree will produce different fruit; perſons who plant the walnut for its fruit, ſhould make choice of the trees in the nurſeries, when they have their fruit upon them."

The principal varieties are, the oval walnut, the round walnut, the large walnut, the ſmall-fruited walnut, the double walnut, the early walnut, the late walnut, the tender-thin-ſhelled walnut, and the hard thick-ſhelled walnut.

Method of Culture.—It may be obſerved that all the ſorts are capable of being increaſed by planting the ſeed or nuts, which in the firſt ſpecies ſhould be of the beſt varieties when intended as fruit-trees, which, after they are become perfectly ripe, and have been preſerved in dry ſand till about the end of February, ſhould be ſet either in ſlight drills, five or ſix inches apart in the rows, and a foot diſtant, or by the dibble, at the ſame diſtance, putting them into the depth of two or three inches, the ground having been previouſly well dug over. When the plants have had two years' growth in the ſeed-bed, they ſhould be removed into nurſery rows, ſhortening the tap roots, but preſerving the tops entire, putting them at the diſtance of two feet and a half from row to row, and a foot and a half in the rows; they ſhould remain in this ſituation till they have attained five or ſix feet in height, training them with ſingle ſtems; after which they may be removed into the ſituations where they are to grow.

When the trees are intended for timber, it is a good practice to plant them out at once where they are to grow, as they thrive faſter, and form better trees.

But in raiſing the walnut for fruit, Mr. Boutcher recommends flat-ſtones, tile-ſhords, or ſlates, to be buried eight inches deep, under the nuts when they are ſet: the diſtance to be ſix inches, and the depth two inches. After two ſeaſons, they ſhould be removed early in autumn, and planted fourteen or ſixteen inches aſunder, on the ſame kind of bottom,

tom, or any hard rubbiſh, to prevent them from ſtriking downwards, and to induce them to ſpread their roots on the ſurface. At the end of two or three years this ſhould be repeated again, making the bedding at the depth of fifteen or ſixteen inches, and planting them two feet aſunder: here let them remain three or four years, when they will be fit to remove for the laſt time. The ſoil for fruit-trees ſhould be dry and ſound, with a ſandy, gravelly, or chalky bottom. The trees managed in this way will have higher flavoured fruit, ripen earlier, and bear a plentiful crop twenty years ſooner than in the uſual method. The beſt manure for them is aſhes, ſpread the beginning of winter, the land having been firſt ploughed or dug over.

And as plants raiſed from the nuts of the ſame tree bear fruit of very different qualities, he adviſes the inarching one of the beſt ſorts on the common walnut-tree; by which method the planter is ſecure of his ſort, and will have fruit in one-third of the time that he would obtain it from the nut. This method can, however, be practicable only in few ſituations. The length of time in which the walnut bears well from the nut, is about twenty years.

The nuts of the two other ſorts are procured from America by the nurſerymen.

Plants of the firſt ſort are cultivated for ornament, as well as the nut or fruit which they afford. The fruit is uſed in two different ſtages of its growth; as, when green, to pickle; and, when ripe, to eat the kernel. For the firſt purpoſe, the young green walnut, when about half or near three parts grown, before the outer coat and internal ſhell become hard, is moſt excellent; for which they are generally ready in July or the following month, and ſhould be gathered by hand, chooſing ſuch as are as free from ſpecks as poſſible.

The fruit is diſcovered to be fully ripe by the outer huſk eaſily ſeparating from the nut, or by the huſks ſometimes opening, and the nuts dropping out; it is uſually about the latter end of September, which, in trees of conſiderable growth, is commonly beaten down with long poles; for, as the walnuts grow moſtly at the extremity of the branches, it would, in very large ſpreading trees, be troubleſome and tedious work to gather them by hand. As ſoon as gathered, they ſhould be laid in heaps a few days to heat and ſweat, to cauſe their outer huſks, which cloſely adhere, to ſeparate from the ſhell of the nuts; then be cleared from the rubbiſh, and depoſited in a dry room for uſe, covering them over cloſe with dry ſtraw, a foot thick, where they will keep three or four months. They are always ready ſale at market, in large towns, where, at their firſt coming in, they are brought with their huſks on, and ſold by the ſack, or buſhel, but afterwards cleaned, and ſold both by the meaſure and the thouſand.

Plantations of theſe trees are therefore profitable, in their annual crops of fruit, while growing, and in their timber, when felled or cut down.

Theſe, as well as the other ſorts, may many of them be admitted into clumps or plantations, in large pleaſure-grounds, for variety. After one or two years, the other ſorts are nearly as hardy as the firſt; but till that time ſhould be protected againſt froſts in the winter ſeaſon.

Juglans *Regia*, *Common walnut-tree*, in the *Materia Medica.* The unripe fruit has an aſtringent bitteriſh taſte, and has been long uſed as a pickle. This is the part directed for medicinal uſe by the London college, on account of its anthelmintic virtues. Its effect in deſtroying worms ſeems to be confirmed by the teſtimony of ſeveral authors; and in proof of its poſſeſſing this vermifuge power, we are told that water, in which the green ſhells of walnuts have been macerated, on being poured in a garden, was found to drive all the earth-worms together as far as the water extended; and that the worms, by being immerſed in a ſtrong infuſion of theſe ſhells, were immediately ſeized with ſpaſms, and died in two minutes afterwards. An extract of the green fruit is the moſt convenient preparation, as it may be kept for a ſufficient length of time, and made agreeable to the ſtomach of the patient by mixing it with cinnamon-water. This fruit, in its immature ſtate, is alſo ſaid to be laxative, and of uſe in aphthous affections and ſore throats. The Wirtemberg Pharmac. directs a rob for the above purpoſes to be prepared of its juice. The kernel of the walnut is ſimilar in qualities to that of the almond and hazel nut, and affords an oil, which amounts to half the weight of the kernel. This oil is ſaid not to freeze by cold, and to anſwer the medical purpoſes of the oil of almonds. Vinegar, in which walnuts have been pickled, has been found to be a very uſeful gargle. Woodv. Med. Bot.

JUGLERS. See Provençal *Poets*.

JUGON, in *Geography*, a town of France, in the department of the North Coaſts, and chief place of a canton, in the diſtrict of Dinan; 10 miles W. of Dinan. The place contains 408, and the canton 9911 inhabitants, on a territory of 147½ kiliometres, in 8 communes.

JUGRAT, a town of Hindooſtan, in the circar of Chanderee; 15 miles N. of Chanderee.

JUGULAR, among *Anatomiſts*, is applied to certain veins of the neck, which terminate in the ſubclavians. See Vein.

Jugular *Vein, how to puncture in bleeding.* See Venesection.

Jugular is alſo applied to certain glands in the neck, in the ſpaces between the muſcles. See Glands.

JUGULARES, in the *Linnæan Syſtem*, is the name of an order or diviſion of fiſh, the general character of which is, that they have ventral fins before the pectoral fins, and oſſiculated bronchiæ. This order comprehends ſix genera; viz. *callionymus*, *uranoſcopus*, *trachinus*, *gadus*, *blennius*, and *kurtus*; which ſee reſpectively.

JUGURTHA, in *Biography*, king of Numidia, was the natural ſon of Manaſtabal, one of the three ſons of Maſſiniſſa, who, after the death of that prince, poſſeſſed the kingdom jointly. Miſcipſa, the ſurvivor, and who inherited his father's kingdom, educated his nephew Jugurtha with his two ſons Adherbal and Hiempſal; but as he was of an aſpiring diſpoſition, he ſent him with a body of troops to the aſſiſtance of Scipio, who was beſieging Numantia, hoping to loſe a youth whoſe ambition ſeemed to threaten the tranquillity of his children. His hopes were fruſtrated, and Jugurtha returned with great glory, having alſo acquired the friendſhip of his general Scipio Africanus. Miſcipſa appointed him ſucceſſor to his kingdom with his two ſons, but the kindneſs of the father proved fatal to the children. Jugurtha cauſed Hiempſal to be aſſaſſinated, and ſtripped Adherbal of his poſſeſſions, and obliged him to fly to Rome for ſafety. The Roman people liſtened to the well-grounded complaints of Adherbal, but Jugurtha's influence prevailed among the ſenators; and the ſuppliant monarch, forſaken in his diſtreſs, periſhed by the ſnares of the enemy, and with every circumſtance of cruelty. Theſe atrocities excited ſuch a flame at Rome, that the ſenate, in effect, declared war againſt Jugurtha. Cæcilius Metellus was ſent againſt him, and by his firmneſs and ſucceſs, the Numidian was forced to ſeek ſupport from his ſavage neighbours. A variety of actions enſued, in which the Roman arms were moſtly ſucceſsful, though Jugurtha, ſkilfully purſuing the Numidian mode of warfare, did not ceaſe to haraſs his enemies, and oppoſe obſtacles to their attempts. Marius and Sylla ſucceeded Metellus, and fought with equal ſucceſs; at length they perſuaded Bocchus, a Mauritanian king, who was in alliance with Jugurtha, and his near relation, to enter into negociations of peace. By tempting offers he agreed to betray Jugurtha, and put him into the hands of his enemies: he was accordingly delivered up to Sylla, after a war of five years. Sylla carried him in chains to Cirtha, whence he was ſent to Rome in the year 106 B C. and the joy teſtified on beholding him there in the condition of a captive, was a proof of the dread which he had inſpired as an enemy. He was expoſed to the view of the Roman people, and dragged in chains with his ſons to adorn the triumph of Marius, after which he was inſulted by the populace, and remanded to his dungeon, where he was either ſtrangled or ſuffered to periſh with hunger. He left two ſons, who ſpent their days in captivity; and his dominions were divided between Bocchus, the remaining heirs of Maſſiniſſa, and the Roman republic. Salluſt. Bell. Jugur. Univerſal Hiſtory.

JUHOO, in *Geography*, one of the mouths of the Indus; 10 miles W. of the Ritchel.

IVIÇA, IBIÇA, *Ebuſus*, the largeſt of the *Pityuſe* iſlands See PITYUSE.

This iſland is about 15½ leagues from the iſland of Majorca, which lies to the N.E. It is commonly ſaid to be ſeven leagues long, and about 4½ broad in certain places, and 22 leagues in circumference. It is high, and covered with mountains, whoſe verdant declivities preſent an agreeable and pictureſque proſpect from the ſea. The ſoil is adapted to every kind of culture. This iſle is divided into five parts, or quartones, *viz.* the plain of the city, St. Eulalia, Balanzar, Pormany, and the Salines. The *Plain* of the town occupies a ſpace of about 1½ league, and contains 200 houſes, ſeparated into little hamlets, the population of which is eſtimated at about 900 inhabitants. The canton preſents on all ſides well cultivated gardens and vineyards. The city furniſhes a ſort of militia, conſiſting of about 1120 men, for the ſafety of the diſtrict. The diſtrict of *St. Eulalia* has a territory of about four leagues in extent, bordering on thoſe of Balanzar and Iviça, and lies to the N E. of the latter. The number of houſes is about 700, diſperſed, without forming towns, villages, or hamlets. They are inhabited by 4000 perſons, diſtributed in two pariſhes. A river, bearing the name of the Saint, flows at the foot of the mountain, where the ſpire of the church of St. Eulalia riſes. The other pariſh is called St. John's. This diſtrict furniſhes a contingent of 700 men for the ſecurity of the iſland. The territory of the diſtrict of *Balanzar* extends over about three leagues, and joins thoſe of Iviça, St. Eulalia, and Pormany. The houſes are reckoned at about 400, and the inhabitants may amount to 2200. The pariſh church is dedicated to St. Michael. The contingent for the ſafeguard of the iſland conſiſts of 300 men. On the coaſt is ſituated the creek of Balanzar, near a mile in length. At the end is the little port of San Michela, which can only admit ſmall veſſels. This port is at the mouth of two rivulets, the ſources of which are upwards of a league in the interior. The diſtrict of *Pormany* has a territory four leagues in length, bounded by Balanzar, Salines, and Iviça. The ſoil preſents a fertile plain, on which are about 450 houſes, containing at leaſt 2000 inhabitants, and furniſhing a contingent of 350 men. The principal church is conſecrated to St. Antony, and its ſteeple, or turret, commands the port, and is guarded by two pieces of cannon, and ſome artillery men. The other church is dedicated to St. Joſeph. The diſtrict of *Salines*, or las Salinas, takes its name from the ſalt found there, and is bounded by the diſtricts of Pormany and Iviça. It is two leagues in extent; the houſes are reckoned at 150, and the population at 900 perſons. The contingent conſiſts of a company of 200 men. On a beautiful plain in this canton is ſituated the church of St. George. Port St. Antony, or Porto-magno, or Pormany, lies on the oppoſite coaſt. Iviça, though its mouth is difficult of entrance, is ſufficiently ſpacious to accommodate a ſquadron; but in the winter ſeaſon it is only fit for ſmall veſſels. The iſlanders of Iviça have criminal as well as civil laws peculiar to themſelves. This iſland belongs to the Spaniards.

IVIÇA, the capital town of the above deſcribed iſland; which has a good port, ſituated to the S.E. below a ſmall hill, under the cannon of a fortreſs conſtructed in the time of Charles V. Some ancient authors aſcribe the foundation of this city to the Phœnicians, 663 years B.C. It was called Pityuſa, becauſe it is covered with pines and firs. Others attribute it to the Carthaginians, 70 years after Carthage was founded, alleging that the name Ebuſus in the Punic language ſignifies arid. The Romans had it in their poſſeſſion; it was afterwards occupied by the Moors; but the Africans were expelled by John, prince of Aragon, archbiſhop of Tarragona; and it has ſince remained under the ſpiritual juriſdiction of this city. The town, which is ſituated on a mountain, is honoured with the title of a biſhopric, and it is alſo the ſeat of government. It has a cathedral, as many monaſteries as pariſhes, one hoſpital, ſeveral churches, and ſome barracks. The town is well fortified, and has two entrances, *viz.* the New Gate, and the Principal. The ſuburbs, commanded by the cannon of the town, contain one church, called St. Elmo, well filled with ſailors. The port, though ſpoiled by the mud, is large enough to contain a ſquadron; it is the largeſt, moſt convenient, and beſt ſheltered in the iſland. The N.E. wind is the only one from which it is not protected. The Engliſh took poſſeſſion of this port in 1706; but the Spaniards have again obtained it. The governor has an aſſeſſor, and ſome other perſons, who aſſiſt him in taking cognizance of all civil, criminal, and military matters, from whom the appeal lies to the captain-general of Majorca. Including the inhabitants of the ſuburb, the population is eſtimated at 800 families, comprehending 3600 perſons. N. lat. 38° 58′. E. long. 1° 22′.

JUICE, a liquid ſubſtance, which makes part of the compoſition of plants; being diffuſed among all the ſolid parts, and ſerving for their nutriment and growth.

The juice, or ſap, is that to plants, which blood is to animals.

There are juices of divers kinds, *aqueous, vinous, oleaginous, gummous, reſinous,* and *bituminous*; and of all taſtes and colours.

JUICE, *Spaniſh*. See LIQUORICE.

JUICE is alſo applied to ſeveral, and even to all, the fluids, or humours, in an animal body.

JUICE is alſo applied to the vapours and humidities incloſed in the earth.

JUICES, *Concrete*, in *Mineralogy*, a name given by many authors, to ſuch ſubſtances found in the bowels of the earth, as have once been in a ſtate of fluidity, and are capable of being rendered fluid again by art, by means of heat, moiſture, or common agents.

Others apply the word *concrete* to all thoſe ſubſtances which may be ſeparated from fluids by chemical operations, whether they are afterwards ſoluble in them again or not; ſuch are the particles of ſpar, ſeparated from water by a ſlow diſtillation, and remaining at the bottom of the veſſel.

The concrete juices of the earth are ſuppoſed to be the principal things which give the virtue to mineral waters; for thoſe which receive no concretion, and are only mingled with the waters in their paſſage through that part of the earth where they are evaporated, on the water's being expoſed to the air, though they may give a briſkneſs to it, while entire in it, yet are not to be ſuppoſed to give the principal virtues. Theſe fluid and volatile juices all fly off in the analyſes of the waters, but the concrete juices are more permanent, and leave certain ſediments which render them viſible and palpable, after the diſtillation of the waters with which they are mixed. When theſe happen to be ſimple, and of the ſame ſpecies with thoſe known in a ſolid ſtate, it is eaſy to deduce the virtues of the waters from them, and to know what muſt be the effect of ſuch fluids as carry ſpar, ſulphur, vitriol, or other well-known ſubſtances, into the blood; but it ſeldom happens that theſe things are thus contained ſimple and entire in the waters, they are often blended variouſly with one another, and often not the whole of the known body is contained, but the principles that conſtitute ſome part of it, ſuch as the acid of vitriol without its metalline part, the baſis of ſea-ſalt without its acid, and ſo of the reſt.

Salts and earths are evidently the moſt ſenſible and the moſt common matters which are mixed with water, and it is from them in general that the medicinal ſprings take up their virtues. There is ſcarcely any earth that does not contain ſome ſort of mineral ſalt, capable of being waſhed out by water, though it be generally in imperceptible quantities; but where the earths are richer in theſe ſalts, the waters not only take them up, but carry alſo with them the ſeveral finer particles of the earth itſelf, in which they are bedded, and riſing up at ſome ſmall diſtance from the place, they make medicinal ſprings, of virtues anſwerable to the peculiar ſpecies of the ſalt that was lodged there. We are always able to ſeparate, by analyſis, the ſalts and the earths of the mineral waters; but when we have done this, we are not arrived at the end of the taſk, for they are often ſuch mixed ſubſtances, that we can neither know them perfectly as they are, nor ſeparate them.

The four moſt known and frequent of thoſe concrete juices which are called ſalts, are alum, nitre, vitriol, and culinary ſalt; but the examination of the waters of different medicinal ſprings ſhews us, that there are in the earth others very different from theſe, and that perhaps in great numbers. There is in Aſia a native alkali ſalt, or natrum, and in all the mineral waters we celebrate, there is a peculiar ſalt ſeparable by evaporation, which is more nearly allied to this than to any of the other four, to one or other of which it has been the cuſtom to reduce all ſalts; and yet different even from this in ſome reſpects. Beſides this, thoſe juices of the ſaline kind, whoſe diſpoſition to concretion is not yet finiſhed, and whoſe ſtate is, as it were, but in embryo, or the firſt ſtage of being, are not to be known, when ſeparated from the waters to which yet they may have perhaps given virtues greater than the concrete, in what we call its more perfect ſtate, might have given: nay, even thoſe that are more formed, and are already concreted, or in a ſtate capable of concretion, have not ſimple and homogeneous ſubſtances in each of the ſpecies. The ſalt that is called culinary ſalt, is obſerved to have two different portions mixed together; the one is condenſed and cryſtallized by cold and in moiſture, after the evaporation of a part of the water wherein this ſalt hath been diſſolved; and the other will not be cryſtallized nor condenſed, but by a total evaporation of the water. The portion of this ſalt that is cryſtallized by cold and in moiſture, is the moſt ſulphureous, and by its ſulphureity it will mix itſelf with the ſulphureous ſalt of calcined tartar reſolved in a moiſt air, or in common water, without turbidneſs, and without coagulation; but that portion of this common ſalt which is not condenſed but by the total evaporation of the water which had diſſolved it, hath an acidity which inſtantly coagulates the ſalt of tartar diſſolved, and all other ſalts in the ſame ſtate which are ſulphureous and nitrous. It is evident, that while this ſalt is in its embryo ſtate, the one or the other alone of theſe two very different ſubſtances of which it is contained, may be mixed with the waters of a ſpring, and communicate virtues different from thoſe which the whole body of the ſalt would have done. This ſalt alſo being procured by evaporation of the water, or by any other analyſis of it, could not be known or referred to the common ſalts, and much leſs if in the earth, as may very eaſily happen, it ſhould be united with ſome one of the conſtituent parts of ſome other ſalt, in the ſame diſunited or unfaſhioned ſtate.

The vitriol which in a moiſt air yields an effloreſcence upon ſulphureous marcaſites, has likewiſe a juicy portion, condenſible only by a total evaporation of its aqueous humidity; this is of a very acrimonious taſte, of an unctuous ſubſtance, and eaſily runs to water in a moiſt air. This juicy portion of vitriol is very different from that which ſhoots and condenſes in the fluid liquor, by means of the cold. Theſe cryſtals are pure vitriol acid, auſtere, and on being mixed with the ſulphureous and nitrous ſalts, a great quantity of earthy matter precipitates out of them; but the other portion will mix itſelf with theſe ſalts in ſolution, without turbidneſs or emotion, not having, like the former, that acidity upon which the ſulphureous or nitrous ſalts can act; which is exactly contrary to what happens to common ſalt, of which the firſt portion is the moſt ſulphureous, and the latter portion the moſt acid. Nitre is alſo, like the reſt, compoſed of two different ſaline portions, the one more ſulphureous, which cryſtallizes with the cold, and in moiſture, and the other, which remains diſſolved after all the cryſtals are obtained, and which cannot be obtained in a dry form, but by the evaporation of all the humidity. This is leſs ſulphureous than the other part obtained in cryſtals, and has ſome acidity which the other has not.

The firſt embryos of mineral ſalts are nothing elſe but vapours or juices not concreted, but totally volatile or vaporable; of theſe ſome may be condenſed, and in part fixed by the action of fire, or diſengaged from their matrices, and made capable of concretion by means of the air, as is obſerved in certain nitrous, aluminous, and vitriolic ſalts. The ſulphureous part, which is formed in the lime, made of certain hard ſtones burnt in the fire, which is generally allowed to be a ſpecies of nitre, has certainly its ſeminal being in theſe crude ſtones, and in that ſtate of its being, is very different from that which we find after it has paſſed the fire, which, from cold and coagulative, changes into cauſtic and reſolutive. This cold and coagulative quality of this ſtony ſalt, in its firſt ſtate, manifeſts itſelf ſufficiently in the waters of certain rock ſprings, which are very limpid and cold, and breed cold and ſchirrous tumours under the throats of thoſe people who ordinarily drink them, as in the Alps, &c. See BRONCHOCELE.

The ſeminal matter of this ſalt then is wholly altered in its nature by fire, and is rendered ſulphureous and cauſtic as nitre. Fire is able to exalt and alter the ſtate of being of this ſalt, but it is no more able to produce it in theſe ſtones than in the ſhells of oyſters, &c. of which alſo a lime is made, which yields a ſalt not more ſulphureous than this. *Du Clos, Obſerv. ſur les Eaux Miner.*

The ſeminal being of alum and vitriol muſt, in the ſame manner, exiſt in thoſe ſubſtances out of which thoſe ſalts are extracted by water, after they have been calcined by ſire, or expoſed to a ſlower calcination in the open air. They are not found in theſe ſtones before theſe proceſſes, yet it is ſufficiently evident that the ſire and air could not produce them, but could only exalt them there.

All theſe varieties to which the ſeveral mineral ſalts are liable in the different ſtages, and in which they may be abſorbed together, and united by water under the earth, do not only render the judging of the mineral waters, which partake of them by analyſes very uncertain, but even, in many caſes, perplex and confound us, by the very means by which we hope to underſtand them.

Juices, *Mineral.* Many countries afford theſe, and give marks by them of treaſures that might be turned to great account, were the proper manner of aſſaying them known, which is by ſirſt properly reducing them to a dry ſubſtance, ſo as to come at the ſolid matter they contain. With a view to the diſcovery of metallic veins, the erection of ſalt-works, vitriol-works, alum-works, borax-works, and the like, the curious on this ſubject may ſind many excellent hints for farther diſcoveries in the cloſe of Agricola's work, "De Re Metallica;" and the view is farther carried on by Boyle, Becher, Stahl, and Homberg. The Royal Academy of Paris have alſo given ſome hints that may be of uſe, in their Memoirs; and ſome practical things are recorded in the Philoſophical Tranſactions. We have accounts in the Philoſophical Tranſactions of white and thick fluids like cream, found in mines at very great depths, and containing mineral particles. The bottoms of our coal-pits ſometimes afford this liquor in very large quantities. And ſome of the iron mines in Shropſhire, particularly that called the White mine near Hales in that county, affords a great quantity of this ſort of juice. It is thick as cream, white, and of a ſweetiſh taſte, but with a vitriolic twang behind it. This is contained in the nodules of iron-ſtone, which are here a ſort of enhydri, very large, compoſed of thick cruſts, and ſome of them holding near a hogſhead of this ſort of liquor. Phil. Tranſ. N° 100. See Enhydros.

JUILLAC, in *Geography*, a town of France, in the department of the Correze, and chief place of a canton, in the diſtrict of Brives; 19 miles W. of Tulles. The place contains 2010, and the canton 9402 inhabitants, on a territory of 125 kiliometres, in 10 communes.

IVINGHOE, is a market town and pariſh in the hundred of Cotſlow, and county of Buckingham, England. It is ſituated on the declivity of a chalk hill, near the ancient Ikeneld-ſtreet, 35 miles diſtant from London, and conſiſts of two ſtreets, containing, at the time of the late population report of 1800, 78 houſes, and 452 inhabitants. In the church, which is a handſome ſtructure, is an altar-tomb, ſaid to be that of a brother of king Stephen. A market was granted to this town in the year 1318: it is now held on Saturday; but it is ſo ſmall, that it may almoſt be ſaid to be diſcontinued. Here are two annual fairs. The pariſh of Ivinghoe is very extenſive, being fourteen miles in length, and containing ſeveral hamlets. In one of theſe, St. Margaret's, which is about five miles diſtant from the town, are the remains of the monaſtery of Murcſley, founded by Henry de Blois, biſhop of Wincheſter, in the reign of Henry I. for nuns of the Benedictine order. At the diſſolution the ſcite was granted to ſir John Dance: it has been lately ſold by Mr. Catherall, in whoſe family it has been during ſeveral generations, to Mr. Mercer. The building was, in 1802, almoſt entire: the parlour and hall, which are of Toternhoe ſtone, appear to be of the age of Henry VII. Lyſons's Magna Britannia, vol. i.

IVIRA, in *Botany*, a Caribbean name for a ſpecies of *Sterculia*, called by Aublet *Ivira pruriens*, Pl. Guian. v. 2 694. t. 279. See Sterculia.

JUJUBE. See Ziziphus and Rhamnus.

JUJUI, in *Geography*, a river of South America, which riſes W.N.W. of Omaguaca, which gives it name; but afterwards, being joined by ſeveral ſmall rivers at St. Salvador, it is called Jujui. On the borders of the province of Chaco, it unites with the Vermejo in S. lat. 24° 50′. Its whole courſe is S.E. nearly 300 miles.

JUJUMORA, a town of Hindooſtan, in the circar of Sumbulpour; 20 miles S.S.E. of Sumbulpour.

JUKAN, a town of Hindooſtan, in Guzerat; 20 miles N. of Noanagur.

JUKUM, a town of the duchy of Courland; 32 miles E.S.E. of Goldingen.

IULE, in the *Muſic of the Ancients*, Athenæus, lib. xiv. a ſong for woollen manufacturers; but afterwards the ſame author ſays it is the name of one of the ſongs or hymns in honour of Ceres, and it was, in fact, a hymn ſung by the Greeks, and after them by the Romans, in the time of harveſt, in honour of Ceres and Bacchus, in order to render thoſe deities propitious.

The word is derived from ȣλα, or ιȣλα, *a ſheaf.* This hymn was ſometimes called *demitrule,* or *demitriule*, that is, the Iule of Ceres.

JULEP, or Julap, *Julapium*, in *Pharmacy*, and derived, according to Menage, from the Arabic *gieulap*, or rather from the Greek ζȣλαπιον: Olearius derives it from *gulap*, a Perſian word, ſignifying *roſe-water;* is an eaſy, agreeable, extemporaneous potion preſcribed to ſick perſons; uſually compoſed of common water, or ſimple diſtilled water, with one-third or one-fourth its quantity of diſtilled ſpirituous water, and ſweetened with ſugar, or proper ſyrups. This is ſharpened with vegetable or mineral acids, or impregnated with other medicines. Juleps are ſometimes uſed as the ordinary drink in certain diſeaſes, but more uſually as a vehicle for other forms of medicines; ſerving chiefly to dilute, to correct the peccant humours, reſtore the declining force of the heart, and promote ſleep.

In diſpenſatories, we have ſeveral different juleps; the principal of which are, the camphor julep, *julepum e camphora.* See Camphor.

The *cordial* julep, which is made by mixing four ounces of ſimple cinnamon-water, two ounces of Jamaica pepper-water, volatile aromatic ſpirit, and compound ſpirit of lavender, of each two drams, and an ounce of ſyrup of orange-peel; and is given in the doſe of two ſpoonfuls, three or four times a day, in diſorders accompanied with great weakneſs and depreſſion of ſpirits.

The *expectorating* julep is formed by mixing four ounces of the emulſion of gum ammoniac with two ounces of the ſyrup of ſquills. Two table-ſpoonfuls of this julep may be taken every three or four hours in coughs, aſthmas, and obſtructions of the breaſt.

Muſk julep is made, by rubbing half a dram of muſk, and half an ounce of ſugar together, and adding gradually two ounces of ſimple cinnamon-water, and as much of peppermint-water, and alſo two drams of the volatile aromatic ſpirit. Two table-ſpoonfuls of this julep may be taken every two or three hours, in a low ſtate of nervous fevers, hiccupping, convulſions, and other ſpaſmodic affections.

The *ſaline* julep is prepared by diſſolving two drams of ſalt of tartar in three ounces of freſh lemon-juice, ſtrained; when the efferveſcence is over, add of mint-water, and common water, each two ounces, and of ſimple ſyrup one ounce. This julep removes ſickneſs at the ſtomach, relieves vomiting, promotes perſpiration, and may be of ſervice in fevers, eſpecially of the inflammatory kind.

The *vomiting* julep is made, by diſſolving four grains of emetic tartar in eight ounces of water, and adding to it half an ounce of the ſyrup of clove July-flowers. This julep may be given, in the beginning of fevers, in the doſe of one table-ſpoonful every quarter of an hour till it operates.

Julep, *Mephitic.* See Pyrmont *Water.*

JULETA, in *Geography*, a town of Sweden, in Sudermania; 35 miles N.W. of Nykioping.

JULFAR, or Dsjulfar, a town of Arabia, in the province of Oman, ſituated on a bay of the Perſian gulf; 100 miles N.W. of Oman. N. lat. 26° 3'. E. long. 57°.

JULGANOO, a town of Hindooſtan, in the Candeiſh; 46 miles E. of Burhampour.

JULGONG, a town of Hindooſtan, in the circar of Aurungabad; 15 miles S.W. of Aurungabad.

IULI, or Catkins, *Petrified*, in *Natural Hiſtory*. Small foſſil bodies are found in the chalk-pits, near the bottom of the chalk ſeries in Cherry-Hinton, in Cambridgeſhire, which Mr. Parkinſon has deſcribed in the 1ſt volume of his Organic Remains, p. 456, and conſiders them as the iuli of the larch, or ſome other tree; Dr. Parſons having conſidered them as parts of the roots of ſome plant, both of which opinions we conſider as very far from probable. Dr. Woodward, from obſerving the great accumulation of iuli, chives, or chaff of the buds of trees and plants, in the peat marſhes of our low fen lands, in his edition to the 2d part of his Natural Hiſtory of the Earth, p. 125, conſiders the ſame as an evidence that the Moſaic deluge happened in the ſpring ſeaſon, as related: not conſidering that the floods of every ſpring and ſummer ſtill bring down ſuch floating bodies in the rivers, and depoſit them on their banks and ſhores in the level parts of their courſe.

JULIA Domna, in *Biography*, ſecond wife of the emperor Severus, was a woman of great accompliſhments, a native of Emeſa, in Syria, and daughter to Baſſianus, prieſt of the ſun. In early life ſhe applied herſelf to the ſtudy of geometry and philoſophy, and became as celebrated for her mental as her perſonal charms. She came to Rome, where her learning recommended her to all the literati of the city. At twenty years of age ſhe married Severus, who, twenty years after this matrimonial connection, was inveſted with the imperial purple. Her accompliſhments made very little impreſſion upon the heart and character of her huſband, who, after a time, became ſo jealous of her, that ſhe thought it right, probably from a conſciouſneſs of guilt, and from a deſire of ſafety, to withdraw from all public affairs, and occupy her time wholly in the ſtudy of letters. She was fully ſenſible of literary merit, and invited to her court men diſtinguiſhed for literary reputation, and it was at her deſire that Philoſtratus wrote the life of Apollonius Tyanæus. Her influence, after the deceaſe of the emperor, was for a time productive of tranquillity and union between her ſons Caracalla and Geta. She oppoſed the plan of dividing the empire, but her attempts were unſucceſsful, and ſo far from being able to effect a fraternal union, ſhe was obliged to be the witneſs of the murder of her favourite ſon Geta, ſtabbed in her own arms by the order of Caracalla. It is ſaid ſhe herſelf was wounded in endeavouring to ward off the fatal blow. She ſoon recovered from her grief, by the flattering attention paid to her by Caracalla, and by his placing her name along with his own in letters to the ſenate and people. Her influence could not prevent him from practiſing thoſe follies and enormities which led to his ruin, and his death plunged her into the deepeſt affliction. Recovering from her grief, ſhe hoped to ſhare the government with Macrinus, the ſucceſſor of her ſon, and being diſappointed in this ſhe retired from court, and died in 217. It is generally admitted that ſhe ſtarved herſelf to death, but whether from the dread of Macrinus, or to free herſelf from the pains of a cancer, has not been aſcertained. She had experienced all the viciſſitudes of fortune: from an humble ſtation ſhe had been raiſed to greatneſs, only to taſte the ſuperior bitterneſs of an exalted rank. Gibbon. Univer. Hiſt.

Julia, in *Ichthyology*, a name given by Salvian and Gaza, to the *ioulos* of the Greek, called *julis* by the Latin writers in general, and by the Italians, *donzellina*. It is a ſpecies of the *Labrus*, according to Artedi, and is diſtinguiſhed by that author from the other fiſh of that kind, by the name of the variegated labrus of a palm long, and having two larger teeth in the upper jaw. See Labrus *Iulis.*

JULIAN, Flavius Claudius Julianus, in *Biography*, Roman emperor, the ſon of Julius Conſtantius, brother of Conſtantine the Great, was born at Conſtantinople in the year 331, and was ſix years of age at the time of the maſſacre of the collateral branches of the Flavian family, after the death of Conſtantine, from which only himſelf and his elder brother Gallus were ſaved. The young princes were extremely well educated; and being brought up in the Chriſtian religion, were baptized, and admitted to ſome inferior eccleſiaſtical offices. Julian publicly read the Scriptures in the church of Nicomedia. Gallus was inveſted with the imperial purple as Cæſar, in the twenty-fifth year of his age; and though he behaved with fraternal affection to Julian, his general conduct was tyrannical and diſguſting, and ſoon brought him to his end. (See Gallus.) From the time that his brother was made Cæſar, Julian was freed from every reſtraint, and put in poſſeſſion of ample patrimony. He had imbibed ſtrong prepoſſeſſions in favour of the doctrines of Paganiſm, which were foſtered by the leſſons of ſome philoſophers of the Platonic ſchool. From Maximus he received a ſecret initiation into the myſteries of the ſcience of theurgy. From his abandoning the principles in which he had been educated, he has obtained the title of "The Apoſtate." At the fatal cataſtrophe of his brother Gallus, Julian partook of this diſgrace, and was kept ſome time at the court of Milan, an object of ſuſpicion. At length he was allowed to retire to Athens, where he was confirmed in all his notions; ſo that there probably did not exiſt in the Roman empire a more ardent votary for Paganiſm than he. About the year 355, he was recalled from his ſtudious retreat to court; was declared Cæſar, and married Helena, the emperor's ſiſter. He was now employed in military enterprize, and in a ſhort time made ſeveral expeditions, in which he humbled the pride of many kings, and recovered 20,000 captives. The riſing reputation of Julian was regarded with envy and jealouſy by the emperor, who, to prevent him from becoming dangerous, deprived him of the principal part of his army. By this, Julian was reduced to great diſtreſs: he was, however, determined to ſubmit. He accordingly made his ſoldiers a ſpeech from the tribunal, exhorting them to loyalty and obedience; and gave the officers a farewel entertainment. Their reluctance to quit a commander, to whom they were ſo much attached, was augmented by this interview; and in the night, the ſoldiers encompaſſed the palace, and ſaluted Julian as the emperor. The prince ſtrenuouſly rejected the proffered honour; and by ſecuring the doors, endeavoured to exclude his perſon from their tumultuary attachment. Till the third hour of the day he remained inflexible to their prayers, their reproaches, and menaces; when being informed, that if he wiſhed to live, he muſt conſent to reign, he complied with their wiſhes. He immediately addreſſed, in his own name, and that of the army, a letter to Conſtantius, acquainting him with the event, and ſoliciting the confirmation of the dignity of Auguſtus, but ſtill acknowledging his ſupremacy as head of the empire, and offering to remain contented with the adminiſtration of the weſtern provinces of Gaul, Spain, and Britain. Conſtantins received his communication like an offended ſovereign, refuſed to admit his aſſumed title, and commanded him to return to his duty, with the rank which he formerly poſſeſſed. Julian now held him at defiance, and diſperſed manifeſtoes juſtifying his conduct; of which one of the moſt characteriſtic ſtill extant was an epiſtle to the ſenate and people of Athens, whom, as a philoſopher, a ſcholar, and a worſhipper of the gods of Greece, he ſeems to have regarded with peculiar reſpect. In his progreſs he was ſtopped by the reſiſtance of Aquileia, held by the troops of Conſtantius; and the approach of that emperor, with his veteran legions, prepared a bloody conflict, which was happily prevented by the ſudden death of Conſtantius on the confines of Cilicia. Julian, now in the thirty-ſecond year of his age, entered Conſtantinople amidſt univerſal acclamations, and was acknowledged the ſole ſovereign of the Roman empire. His elevation to ſupreme power made no alteration in his character: he was a philoſopher on the throne, as far as that title is merited by ſtrict temperance, diſregard of idle pomp, and trifling amuſements; the diligent employment of his time in active occupations, or the purſuit of mental improvement, and conſtant ſtudy to fulfil the duties of his ſtation. The ruling paſſion of Julian was to reſtore the heathen religion in all its ancient ſplendour; and to this, in various inſtances, he ſacrificed both policy and juſtice. He wrote an elaborate work againſt the truth of Chriſtianity, of which ſome fragments only have come to modern times. An edict of general toleration was his firſt meaſure, which produced the re-opening of all the heathen temples, and the return of Chriſtian ſectaries, who had been baniſhed by the late emperor. He endeavoured to render Paganiſm more reſpectable in the eyes of the public, by certain regulations for ſecuring the morals of the prieſthood. He invited to his court all the eminent philoſophers, and men of learning of that perſuaſion; and he encouraged proſelytes, by tokens of imperial favour. The reſtoration of the ancient temple of Jeruſalem attracted the ambitious mind of the emperor, who flattered himſelf that the completion of the undertaking would be at leaſt a ſpecious argument againſt the faith of prophecy, and the truth of revelation. To accompliſh it, he employed one of his ableſt generals, and ordered the governor of Paleſtine to lend his moſt ſtrenuous ſupport in reſtoring the work of Solomon to its priſtine beauty. But neither the power of an emperor, the reſources of an empire, nor the enthuſiaſm of a whole people, could effect the purpoſe. A commencement was made of this work; but the builders were interrupted by extraordinary irruptions of fire, which obliged them to abandon their undertaking. Though reſtrained either by prudence or temper from the violence of perſecution, Julian ſyſtematically purſued meaſures calculated to degrade and depreſs the Chriſtians. He treated them with the language of ſarcaſtic contempt, deprived them of the management of charitable contributions, and levelled all the honours of ſacerdotal rank. He forbade all Chriſtians from acting as teachers of grammar and rhetoric, or the liberal arts; thus compelling their youth to remain uneducated, or to receive, with the rudiments of learning, impreſſions ſubverſive of their faith. He excluded them from poſts of truſt and honour; and condemned them to make ample amends for the deſtruction of Pagan temples in the preceding reigns, and reſtitution of lands and revenues, which had been converted to the uſe of their own religion. The love of military glory was another paſſion by which Julian was actuated; and the field which he thought moſt worthy of its indulgence was the Perſian empire, long the rival and formidable foe of the Roman. When he croſſed the Tigris, he burned his ſhips, that his ſoldiers might proceed with firmneſs and reſolution. He defeated the Perſians drawn up to oppoſe him, and puſhed on to the gates of the capital. Miſled by treacherous guides, he was preſently reduced to a ſcarcity of proviſions; and he found that the only means of ſafety for his army conſiſted in retreat. In the mean time, the whole force of the Perſian empire was aſſembled, and clouds of light troops haraſſed the Romans on every ſide, while the main body of the Perſian hoſt advanced in formidable array. Julian performed every duty of a ſoldier and a general, partook in every fatigue and hardſhip, and was preſent wherever danger was moſt urgent. The attacks of the enemy were ſeveral times repelled: at length Julian was mortally wounded, fell ſenſeleſs from his horſe, and was conveyed from the field in a ſtate which announced approaching death. Senſible of his ſituation, he pronounced a farewel ſpeech to the ſurrounding officers, and directed the diſpoſal of his private property; after which, he entered into a metaphyſical diſcuſſion with regard to the nature of the ſoul. Exhauſted by theſe efforts, he called for a draught of cold water; and as ſoon as he had ſwallowed it, calmly expired, on June 26th, 363. The character of no eminent perſon has been more differently repreſented by friends and enemies. Of his writings, which are compoſed in the purity of the Greek language, one of the moſt curious is entitled "The Cæſars," which, in the form of a fable, freely diſcuſſes the characters of the ſeveral emperors, his predeceſſors. He gives the decided preference to Marcus Antoninus, whom he made his model in his religious and philoſophical quality, although in temper he was a very different man. The learned Spanheim gave an elaborate edition of his works in Greek and Latin, in folio, 1696. Julian's partiality for every thing Grecian had infuſed into his mind a love of liberty, and a ſenſe of the natural equality of mankind; and he rejected with abhorrence the haughty title of "Lord," which the Romans had introduced in addreſſing the maſter of the empire. He alſo imitated the beſt of the emperors, in paying reſpect to the conſular dignity, and obedience to the laws of the ſtate. He frequently ſat upon the bench as judge, and adminiſtered juſtice with great impartiality between the rich and the poor. He poſſeſſed ſound ideas of legiſlation; and it is to the credit of his character, that, of the laws enacted during his ſhort reign, fifty-four have been received into the codes of Theodoſius and Juſtinian. Univer. Hiſt. Gibbon's Rom. Hiſt. vol iii. and iv.

The moſt ancient proof of an inſtrument, reſembling a modern organ, blown by bellows, and played with keys, very different from the hydraulicon, which is of much higher antiquity, is a Greek epigram in the Anthologia, attributed to the emperor Julian, who flouriſhed about 364. We ſhall here give a literal tranſlation of this epigram, which, though it contain no very beautiful or poetical images, will anſwer the hiſtorical purpoſe of aſcertaining the exiſtence of an inſtrument in the fourth century, which, in many particulars, reſembled a modern organ.

We ſhall inſert the original here, for the ſatisfaction of the learned reader, from the Anthol. lib. i. cap. 86. 8.

Αλλοίην ὁρέω δονάκων φύσιν· ἦπου ἀπ' ἄλλης
Χαλκείης τάχα μᾶλλον ἀνεβλάστησαν ἀρούρης,
Αγριοι, οὐδ' ἀνέμοισιν ὑφ' ἡμετέροις δονέονται,
Αλλ ὑπο ταυρείης προθορὼν σπήλυγγος ἀήτης,

Νέρθεν ἐϋτρήτων καλάμων ὑπὸ ῥίζαν ὁδεύει.
Καί τις ἀνὴρ ἀγέρωχος ἔχων θοὰ δάκτυλα χειρὸς,
Ισταται ἀμφαφόων κανόνας συμφράδμονας αὐλῶν·
Οἱ δ' ἀπαλὸν σκιρτῶντες, ἀποθλίβουσιν ἀοιδήν.

"I ſee reeds of a new ſpecies, the growth of another and a brazen ſoil; ſuch as are not agitated by our winds, but by a blaſt that ruſhes from a leathern cavern beneath their roots; while a *robuſt* mortal, (ἀγέρωχος, a tall ſturdy fellow, alluding to the force neceſſary to beat down that kind of clumſy *carillon* keys of this rude inſtrument of new invention,) running with ſwift fingers over the concordant keys, (the rulers of the pipes, αυλων; literally *keys*,) makes them, as they ſmoothly dance, emit melodious ſounds."

Nothing material is omitted in the verſion of this epigram, or rather enigma, upon the organ, though not a very ingenious one; for the word αὐλων, the *pipes*, diſcovers the whole myſtery.

JULIAN *Calendar*, *Epocha*, and *Period*. See the ſubſtantives.

JULIAN *Law*. See PAPIAN POPÆAN *law*.

JULIAN *Year*. The Julian is the old account of the year, uſed among us in England till 1752. It is ſo called from its founder Julius Cæſar; and by that name is diſtinguiſhed from the new, or Gregorian account, uſed in moſt parts of Europe. See YEAR.

JULIANS, in *Botany*. See *Dame's* VIOLET.

JULIEN, SAINT, *des Meneſtriers*, in *Biography*. M. Millot, in his Hiſtory of the Troubadours, tells us, that William IX. count of Poitou, in one of his poems, after relating a particular adventure with a common woman in very free terms, and reflecting upon his *bonnes fortunes*, or favour with the ladies, thanks God and St. Julien for his ſucceſs. "It was then," ſays M. Millot, "cuſtomary, ſuch was the ſuperſtition of the times, for libertines to invoke heaven for ſucceſs in their moſt profligate undertakings; and St. Julien was the particular ſaint and protector to whom they addreſſed themſelves upon ſuch occaſions:" as, in higher antiquity, Mercury was the patron divinity of thieves.

This ſaint, in order to expiate an involuntary crime, is ſaid to have made a vow that he would receive into his houſe all paſſengers who ſhould be in want of a habitation, by which he obtained the title of the "Hoſpitable Saint," and was afterwards addreſſed as the patron of travellers, to whom prayers were made for a good lodging. "L'Oraiſon de St. Julien, et l'Hôtel de St. Julien," were afterwards uſed by the French in pleaſantry, much in the ſame ſenſe as with us, *dining with duke Humphrey*. But in the tales written in old French ſo early as the twelfth century, the alluſion was more licentious. Boccace (Giorn. II. nov. 2.) ſpeaks of the "Paternoſtro di San Giuliano," and makes Rinaldo, after a ſucceſsful adventure with a female, return thanks to God and St. Julien: "Per la qual coſa Rinaldo Iddio, et San Giuliano ringraziando, montò a Cavallo." La Fontaine, who has tranſlated this tale, calls it "L'Oraiſon de St. Julien."

JULIEN, *St.*, in *Geography*, a town of France, in the department of the Jura, and chief place of a canton, in the diſtrict of Lons-le-Saulneir; 18 miles S. of Lons-le-Saulneir. The place contains 899, and the canton 7098 inhabitants, on a territory of 120 kiliometres, in 29 communes.—Alſo, a town of France, in the department of the Côte d'Or; nine miles N.N.E. of Dijon.—Alſo, a town of France, in the department of the Leman, and chief place of a canton, in the diſtrict of Geneva; five miles S.W. of Geneva. The place contains 750, and the canton 11,071 inhabitants, on a territory of 197½ kiliometres, in 24 communes.—Alſo, a town of France, in the department of the Rhône and Loire; 13 miles E.S.E. of St. Etienne.

JULIEN'S, *St.*, *Bay*, a large bay, containing a port, on the coaſt of Patagonia. S. lat. 49° 8'. W. long. 67° 43' 30".

JULIEN *en Champſeur*, *St.*, a town of France, in the department of the Higher Alps; ſix miles N. of Gap.

JULIEN *de Chapteuil*, *St.*, a town of France, in the department of the Upper Loire, and chief place of a canton, in the diſtrict of Le Puy; ſeven miles E. of Le Puy. The place contains 2151, and the canton 7448 inhabitants, on a territory of 152½ kiliometres, in 7 communes.

JULIEN *l'Ars*, *St.*, a town of France, in the department of the Vienne, and chief place of a canton, in the diſtrict of Poictiers; ſix miles E. of Poictiers. The place contains 281, and the canton 4997 inhabitants, on a territory of 207½ kiliometres, in 13 communes.

JULIEN *de Montagnier*, *St.*, a town of France, in the department of the Var; nine miles N.W. of Barjols.

JULIEN *de Vouvantes*, *St.*, a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Chateaubriant; ſeven miles S.S.E. of Chateaubriant. The place contains 1401, and the canton 5676 inhabitants, on a territory of 212½ kiliometres, in 5 communes.

JULIEN *du Sault*, *St.*, a town of France, in the department of the Yonne; ſix miles N.W. of Joigny.

JULIERS, *Duchy of*, lately a country of Germany, but now annexed to France, and forming a part of the department of the Roer. This duchy was formerly bounded on the N. by the duchy of Gueldres, on the E. by the electorate of Cologne and the Rhine, on the S. by the territories of Blankenheim and Schleiden, and on the W. by the biſhopric of Liege, the duchy of Gueldres, and the Meuſe. The ſoil is fertile, producing corn in abundance, and yielding good meadow and paſture land; it furniſhes a good breed of cattle and of horſes. Wood is plentiful, and linen is manufactured. Near Eſchweiler ſtone-coal is found. In this duchy are 26 towns, and about 11 free boroughs. See ROER.

JULIERS, a town of France, in the department of the Roer, and chief place of a canton, in the diſtrict of Cologne, ſituated on the Ruhr. It is ſaid to have received its name from the Romans. The town is ſmall but ſtrong, and has a regular citadel. It has a church and a convent, and without the walls are a Calviniſt and a Lutheran church. The place contains 2126, and the canton 12,639 inhabitants, in 28 communes. This town ſurrendered at diſcretion to the French troops in October 1794, after a ſevere battle between the Auſtrians and French. N. lat. 50° 54'. E. long. 6° 18'.

JULIFUNDA, a town of Africa, in the country of Dentila; 10 miles W. of Baniſerile.

JULIO, a mountain of the Griſons, N. of the Upper Engadine; eight miles S.W. of Zulz.

IULIS, in *Ichthyology*, the name of a ſmall fiſh, a ſpecies of the labrus, caught principally about Genoa, and ſold in the markets, being a very delicately taſted fiſh. Its uſual ſize is about the length, and a little more than the breadth of a finger. The males of this ſpecies are very beautifully painted. Their backs are green, and their heads have variegations of yellow and red. Its ſides have very broad ſerrated lines of a fine gold yellow, and its back fin has ſeveral large ſpots of blue and red. They are fond of human blood, and will ſeize upon the legs of people who walk naked into the water. See LABRUS *Iulis*.

JULIUS I. in *Biography*, pope, was a Roman by birth, and ſucceeded to the papal ſee on the death of Mark, in the year 337. At this period the celebrated Athanaſius lived in a ſtate of exile at Treves, but in the following year he was permitted to return to Alexandria by the emperors Conſtantine, Conſtantius, and Conſtans. This circumſtance excited the alarm of the Arian party, who, at a council aſſembled at Antioch, got Athanaſius depoſed, and Gregory, biſhop of Alexandria, appointed in his ſtead. But in the Roman council, Athanaſius was pronounced innocent of the crimes alleged againſt him, and was admitted by Julius to his communion, as an orthodox pillar of the church. The orthodox party confirmed the acts of the council of Rome, and, in the height of their zeal, they introduced for the firſt time, and authorized the practice of appealing to the pope, in conteſted eccleſiaſtical concerns, of which the ſucceſſors of Julius availed themſelves in eſtabliſhing the enormous ſpiritual tyranny, which, by degrees, they erected in the church. Julius died in 352, having ſat upon the pontifical throne ſomewhat more than fifteen years. Two of the letters of this pope are extant, one addreſſed to the Oriental biſhops, and the other to the people of Alexandria in favour of Athanaſius.

JULIUS II. pope, formerly known by the name of "Julian della Rovere," nephew of pope Sixtus IV., was born in the year 1443. He is ſaid to have been of very mean extraction, and to have followed for ſome time the occupation of a waterman; he was preferred by his uncle Sixtus to the ſee of Carpentras, and raiſed to the purple in the year 1471. By the ſame pope he was raiſed ſucceſſively to other valuable biſhoprics, and upon the breaking out of an inſurrection in Ombria, his uncle gave him the command of the papal troops, which was an employment perfectly adapted to his genius. He put an end to the rebellion which gave him vaſt influence and power at Rome. In 1480 he took an active part in the elevation of Innocent VIII. to the papacy, and while that pontiff lived he was in high favour at the papal court; but during the popedom of his ſucceſſor Alexander VI., thinking his life in danger, he retired into France, and attended king Charles in his expedition againſt Naples. In 1503 he was himſelf elected pope, in the ſtead of Pius III. who had held the ſacred office only twenty-ſix days. He took the name of Julius II., and, being poſſeſſed of a bold and martial ſpirit, determined to extend the temporal empire of the church by the force of arms. The emperor Maximilian, with the kings of France and Arragon, endeavoured to depoſe him, but he fruſtrated their deſigns, and in the year 1508 the famous league of Cambray againſt the republic of Venice was concluded between the pope, the emperor, the king of France, and the king of Spain, which threatened the entire ruin of that ſtate. Before Julius ſigned this league, his unwillingneſs to increaſe the power of either the emperor, or the French king in Italy, induced him privately to communicate the terms of it to the Venetian ambaſſador, at the ſame time offering not to confirm it, provided that the republic reſtored to him the cities of Rimini and Faenza. This propoſal was moſt unwiſely rejected by the Venetian ſenate, and Julius confirmed the league. The Venetians were wholly unable to withſtand ſuch powerful enemies, and being reduced to the greateſt extremities, they were obliged to ſubmit. The pope abſolved them from the effects of the ſentence of excommunication iſſued againſt them, and without heſitation granted leave to all the ſubjects of the church to ſerve under their banners. He now formed the deſign of driving the French out of Italy, and with this view he laid ſiege to Mirandola, which he entered in triumph in 1511, but fortune turning againſt him, he was driven to Rome. In the courſe of his journey he received the unwelcome intelligence, that an order for the aſſembling of a general council at Piſa was poſted up at Modena, Bologna, and other cities in Italy, and that himſelf was ſummoned to appear at it in perſon. To counteract their proceedings, of which he had reaſon to entertain apprehenſions, the pope ſummoned a general council to meet the following year at Rome, pretending, by that meaſure, to have ſuperſeded the council convoked at Piſa. An end, however, was not put to the ſeſſions of this council before a decree had been paſſed declaring pope Julius II. a diſturber of the public peace, a ſower of diſcord among the people of God, a rebel to the church, a public incendiary, a blood thirſty tyrant, and as ſuch ſuſpended from all ſpiritual and temporal adminiſtration of the church, and forbidding the faithful thenceforth to acknowledge or obey him. In revenge, Julius excommunicated the king of France, laid his kingdom under an interdict, and abſolved his ſubjects from their oath of allegiance. In May 1512 the council met at Rome, in oppoſition to that of Piſa, but during the fifth ſeſſion, the pope was ſeized with an illneſs which proved fatal to him in Feb. 1513, at the age of ſeventy, and after a pontificate of between nine and ten years. Julius was a perſon of great abilities, courage, and reſolution, but arrogant and of inſatiable ambition; poſſeſſing the moſt extravagant paſſion for war and bloodſhed; ſo that it was ſaid of him, if he wanted the qualities of a good biſhop, he had at leaſt thoſe of a conquering prince. He has been accuſed of every crime, but his faults have been probably much exaggerated. He was much leſs chargeable with nepotiſm than many preceding popes; for of the twenty-ſeven cardinals created by him, four only were in any degree related to him, and theſe were men of unblemiſhed characters. He was an encourager of the arts of painting, ſculpture, and architecture, and begun the erection of the magnificent church of St. Peter.

JULIUS III. pope, formerly known by the name of John-Maria del Monte, was a perſon of mean extraction, and born in Rome about the year 1488. His uncle Anthony del Monte was made a cardinal by pope Julius II., and thus had the means of raiſing his family from obſcurity. Under his patronage John-Maria was educated for the church, and diſtinguiſhed himſelf by his proficiency in literature and juriſprudence. By his uncle's influence he obtained an archbiſhopric, and afterwards filled various poſts under the holy ſee. In 1536 he was created a cardinal by pope Paul III. who afterwards employed him on different legations. He acquitted himſelf ſo well in theſe employments, that he obtained the character of a perſon of vaſt application and uncommon abilities, and he recommended himſelf ſo powerfully to his holineſs, that in the year 1545 he appointed him his principal legate in the council of Trent, and confided to him his moſt ſecret intentions. In February 1550 he was elected to the popedom, and took the name of pope Julius III. out of reſpect to the memory of the pontiff, who, by raiſing his uncle to the cardinalſhip, had laid the foundation of his good fortune. One of his firſt acts gave great offence to every decent perſon; he conferred a cardinal's hat, with ample eccleſiaſtical revenues, upon a youth of ſixteen, born of obſcure parents, and known by the name of Ape, from his having been entruſted with the care of an animal of that ſpecies, in the cardinal del Monte's family. Such an indecent promotion was regarded by the cardinals as a groſs affront offered to their body, but when they reproached him for introducing ſuch an unworthy member into the ſacred college, who had neither learning nor virtue, nor merit of any kind: he aſked them "what virtue or merit they had found in him, that could induce them to place him in the papal

papal chair?" The ſubſequent conduct of Julius correſponded with this ſhameleſs behaviour at the commencement of his pontificate. He gave himſelf up to the unreſtrained indulgence of his deſires, and ſpent his whole time, and the revenues of the church in amuſements, diſſipation, and licentiouſneſs of every kind. He died in 1555, having held the papal ſee about five years. Moreri. Bower. Bayle.

JULKADDER, in *Geography*, a town of Hindooſtan, in Bengal; 27 miles S. of Iſlamabad.

JULKANPOUR, a town of Hindooſtan, in Guzerat; 50 miles N.W. of Amedabad.

JULLOMA, a town of Peru, in the dioceſe of La Paz; 50 miles S.W. of La Paz.

JULSIO, a town of Sweden, in Weſtmanland; 52 miles N.W. of Stroemſholm.

JULTOWKOW, a town of Poland, in the palatinate of Braclaw; 5½ miles W.N.W. of Braclaw.

IULUS, in *Antiquity*. See IULE.

IULUS, in *Botany*, an old name for the *amentum*, or catkin, of Linnæus; but the word being now appropriated to a genus of inſects, is laid aſide by botaniſts.

IULUS, in *Entomology*, a genus of aptera, with the lip crenated and emarginated; feelers two, and filiform; body long, ſemi-cylindrical, and conſiſting of numerous tranſverſe ſegments; legs numerous, being two on each ſide of every ſegment of the body. This is the definition of the genus, according to the Gmelinian ſyſtem. Fabricius, to whom we are indebted for our knowledge of ſeveral new ſpecies, diſtinguiſhes it merely by the lip and antennæ; the firſt of which, he obſerves, is crenated and emarginate, and the latter moniliform: in addition to theſe peculiarities, the ſtructure of the body, legs, &c. conſtitute a ſecondary character. The ſpecies are chiefly aſcertained by the number of the legs.

Species.

OVATUS. Legs each ſide twenty. Linn. *Oniſcus*, Gronov.

Inhabits the ſeas of Europe.

COMPLANATUS. Legs each ſide thirty; body flattiſh; tail pointed. Fabr. *Iulus complanatus*, Linn., Degeer, &c. *Scolopendra Iulacea*, Scop. *Iulus ſcolopendricus*, Pod. Muſ.

Native of Europe. Linnæus deſcribes the antennæ of this inſect as being clavated, which is the caſe, though ſlightly.

DEPRESSUS. Legs each ſide thirty; body flattiſh; tail rounded and entire. Fabr.

An Indian ſpecies of very large ſize, the head of which is brown, and the ſegments rough, grey, and prominent, each ſide. Lund.

STIGMA. Legs thirty each ſide; body black, with a white dot each ſide on every alternate ſegment. Fabr.

Found at Tranquebar by Dr. Koenig. Its ſize is twice that of Iulus complanatus; the antennæ and legs are black; tail pointed and white.

TRIDENTATUS. Legs each ſide thirty-ſix; tail armed with three teeth. Fabr.

An American ſpecies, in the cabinet of Drury. The eighteen ſegments of the body grey, and each marked with a ferruginous dorſal dot; legs with two denticles at the baſe.

VARIUS. Legs ſeventy-eight each ſide; ſegments of the body black at the baſe, and white at the tip. Fabr.

A ſpecies of moderate ſize, which inhabits Italy. The head is black, with a white band in the middle; ſegments whitiſh, and having a fine or thin ferruginous margin; legs black.

CRASSUS. Legs each ſide eighty. Linn.

Native of Aſia. Pale, with a line of minute black dots each ſide; tail acute.

TERRESTRIS. Legs each ſide one hundred. Linn. *Iulus faſciatus*, Degeer.

Inhabits Europe. Don. Br. Inſ.

CARNIFEX. Legs each ſide ninety-four; head and legs red; tail with a red line. Fabr.

Native of Tranquebar.

INDUS. Legs each ſide one hundred and fifteen. Linn.

Inhabits India.

SABULOSUS. Legs each ſide one hundred and twenty. Linn. *Iulo glabro*, &c. Ray.

Found on the nut in Europe.

FUSCUS. Legs each ſide one hundred and twenty-four. Linn.

An inhabitant of India.

MAXIMUS. Legs each ſide one hundred and thirty-four. Linn.

A large ſpecies found in South America.

IULUS, in *Ichthyology*, a ſpecies of *Cyprinus*; which ſee.

JULY, in *Chronology*, the ſeventh month of the year, during which the ſun enters the ſign Leo. The word is derived from the Latin *Julius*, the ſurname of C. Cæſar the dictator, who was born in it. Mark Antony firſt gave this month the name July, which was before called *Quintilis*, as being the fifth month of the year, in the old Roman calendar eſtabliſhed by Romulus, which began in the month of March. For the ſame reaſon, Auguſt was called *Sextilis*; and September, October, November, and December, ſtill retain the name of their firſt rank.

"Quæ ſequitur, numero turba notata ſuo."

On the third day of this month the dog days are commonly ſuppoſed to begin, and to end on the eleventh day of Auguſt. See CANICULAR *Days*

JULY *Flowers*, or *Gillyflowers*, in *Botany*. See PINK.

JULY *Flower*, *Clove*. See DIANTHUS and PINK.

JULY, *Queen's*, *Flower*. See *Dame's* VIOLET.

JULY, *Stock*, *Flower*. See STOCK, &c.

JUMANAH, in *Geography*, a river of Bengal, which runs into the bay, N. lat. 21° 34'. E. long. 88° 38'.

JUMANDAR, a town of Aſiatic Turkey, in Natolia; 24 miles E.S.E. of Degnizlu.

JUMBO, a town of Africa, in the kingdom of Kaſſon; 5 miles N.W. of Kooniakary.

JUMBOOAH, a town of Hindooſtan, in Guzerat; 5 miles S. of Broderah.

JUMCUNDY, a town of Hindooſtan, in Viſiapour; 11 miles W. of Galgala.

JUMDAY, a town of Bengal; 30 miles S. of Boglipour.

JUMEAUX, a town of France, in the department of Puy-de-Dôme, and chief place of a canton, in the diſtrict of Iſſoire. The place contains 1106, and the canton 7525 inhabitants, on a territory of 122½ kiliometres, in 10 communes.

JUMETTAS, or YUMETTAS *Keys*, a range of rocks or iſlets among the Bahamas, extending from the S.W. coaſt of the iſland of Yuma. N. lat. 22° 40'. W. long. 76°.

JUMGERBAD, a town of Hindooſtan; 30 miles W. of Benares.

JUMILAMURKA, a town of Hindooſtan, in the Carnatic; 25 miles N.N.W. of Ongola.

JUMILLA, a town of Spain, in the province of Murcia; 22 miles S.W of Murcia. The town is ſmall, but contains about 8000 inhabitants. It is ſituated at the entrance of a large and magnificent valley, at the foot of the mountain on which its old caſtle ſtands. The ſtreets are ſtraight, long, and large, but unpaved; the houſes are clean, though not ſplendid. It has an hoſpital under the title of the Holy Ghoſt, a convent of Franciſcan monks, and two pariſh churches.

JUMILLAC, Le Grand, a town of France, in the department of the Dordogne, and chief place of a canton, in the diſtrict of Nontron; 9 miles N. of Exideuil. The place contains 2424, and the canton 8056 inhabitants, on a territory of 215 kiliometres, in 7 communes.

JUMMANEAH, a town of Hindooſtan, in Candeiſh; 10 miles N.E. of Peploud.

JUMMEEDY, a town of Bengal; 24 miles S. of Ghidore.

JUMMOO, Jumbo, or *Jumbhu*, a town of Hindooſtan, and capital of a diſtrict in Lahore, to which it gives name. It is diſtant 42 coſſes from Biſſooly, and 50 about N. by E. from Lahore. It is ſituated on the ſide of a hill, near the river Rauvee, and divided into Upper and Lower Towns. This place is a mart of conſiderable conſequence. Various circumſtances concurred to divert the trade of Cachemire or Caſhmere to Jummoo, and thus to render it a place of extenſive commercial reſort, where perſons of all deſcriptions, under the protection and encouragement of its chief, experienced in their perſons and property full ſecurity. The commodities, conſtituting the trade of Jummoo and Caſhmere, are tranſported by men, uſually Cachemirians, whoſe burdens are heavy, two of them making the load of a mule, and the hire is fixed at the rate of four rupees for each carrier. The ſhawls, when exported from Cachemire, are packed in an oblong bale, containing a certain weight or quantity, which, in the language of the country, is termed a "bidding," encloſed in an ox's or buffalo's hide, and carried by the Cachemirian as a Scotchman carries his pack.

In 1770, the period of Runzeid Deve's death, Jummoo ſuſtained a grievous loſs; for one of his ſons ſeized the government, put to death one of his brothers, who was intended by the father for his ſucceſſor, and impriſoned another. The Seiks embraced this opportunity of invading Jumbo, from which they had before exacted a moderate tribute. The moſt valuable diviſion of the Jumboo diſtricts lay in the plain country, and formed a part of the Panjab. Theſe were laid waſte by the Seiks, under a pretence of giving aſſiſtance to the fugitive chief, who recurred to them for protection. N. lat. 33°. E. long. 74° 5'.

JUMMUCANDY, a town of Bengal, 20 miles S.W. of Moorſhedabad. N. lat. 23° 56'. E. long. 88° 13'.

JUMNAH, a river of Hindooſtan, which riſes in Thibet, and paſſing by Delhi, runs into the Ganges at Allahabad.

JUMNEE, a town of Bengal; 20 miles W. of Noony.

JUMOTTO, a town of Japan, in the iſland of Ximo; 12 miles S.E. of Nangaſaki.

JUMP, in *Mining*, is one among the very numerous appellations, which the diſlocations of the ſtrata have received from the practical miners of different diſtricts. See our article Fault.

JUMPER is the name for a long iron tool, with a ſteeled chiſſel-like point, which they uſe in quarries and mines, for drilling, or boring ſhot-holes in rocks, which require to be blaſted with gunpowder. Drill, neger, and gad, are other terms for this tool.

JUMUNDERAD, in *Geography*, a town of Sweden, in the province of Angermanland; 24 miles N. of Hernoſand.

JUNAGUR, or Chunagur, a city and fortreſs of Hindooſtan, in Guzerat; 170 miles S.W. of Amedabad. N. lat. 24° 50'. E. long. 69° 54'.

JUNASKA, one of the Fox iſlands, in the Pacific ocean. N. lat. 53° 26'. E. long. 189° 14'.

JUNAT, a town of Bengal; 13 miles N.E. of Rogonatpour.

JUNCAGO, in *Botany*, Tourn. Inſt. t. 142, ſo called from its reſemblance to a *juncus*, or ruſh. See Triglochin, Arrow-headed graſs.

JUNCAL, in *Geography*, a ſea-port of South America, in the country of Chili, ſituated on the coaſt of the Pacific ocean; 50 miles N. of Copiapo.

JUNCALAS, a town of France, in the department of the Upper Pyrenees, and chief place of a canton, in the diſtrict of Argelès; 12 miles S. of Tarbes. The place contains 400, and the canton 4572 inhabitants, on a territory of 102½ kiliometres, in 18 communes.

JUNCAW, a town of Hindooſtan, in the circar of Mohurſunge; 25 miles N. of Harriorpour.

JUNCEÆ, in *Botany*, Brown Prodr. Nov. Holl. v. 1. 257. See below.

JUNCI, the 13th natural order of plants in Juſſieu's ſyſtem, or the third of his third claſs. It is named from one of its principal, or leading genera, *Juncus*, the Ruſh, properly ſo called.

Juſſieu's third claſs comprehends monocotyledonous plants whoſe ſtamens are inſerted into the calyx or corolla. His definition of the preſent order is as follows.

Calyx (which, in ſome of the genera, we ſhould, with Linnæus, term *corolla*) inferior, in ſix deep ſegments, (rather of ſix leaves,) either equal or unequal, the three alternate ones, in the latter caſe, being larger, and petal-like, or it is glumaceous, and akin to the huſks of graſſes. *Stamens* definite (except in *Sagittaria* and perhaps *Aliſma*), moſtly ſix, rarely three or nine, inſerted into the lower part of the calyx. *Germen* ſuperior, in ſome ſimple, with a ſingle ſtyle; the ſtigma ſimple or divided; capſule of three cells and three valves; with many ſeeds, inſerted into the partitions originating from the centre of each valve. In others the germens, ſtill ſuperior, are three or ſix, rarely indefinite, ſometimes united at their baſe; ſtyles and ſtigmas equal to them in number, as well as the capſules, which are ſingle-celled, either diſtinct or united, either ſingle-ſeeded and often not burſting, or many-ſeeded, ſeparating into two valves at their inner edge, the margins of the valves, (or the partitions) bearing the ſeeds. Corculum (perhaps of all) in the ſcar of a horny albumen. Plants herbaceous. The radical leaves, as well as thoſe on the lower part of the ſtem, alternate and ſheathing; the upper and floral leaves often aſſuming the form of a ſpatha, and ſeſſile. Flowers furniſhed with ſpathas.

The ſections are four.

1. Germen ſolitary. Capſule of three cells. Calyx glumaceous.—This compriſes five genera, all Linnæan, *Eriocaulon*, *Reſtio*, *Xyris*, *Aphyllanthes*, and *Juncus*, the laſt only properly anſwering to the character.

2. Germen ſolitary. Capſule of three cells. Calyx half petal-like.—Here are ſix genera, *Mnaſium* of Schreber (which is *Rapatea* of Aublet), *Syena* of Schreber (Aublet's *Mayaca*), *Pollia* of Thunberg, *Calliſia*, *Commelina*, and *Tradeſcantia* of Linnæus.

3. Germens ſeveral. Capſules as many, ſingle-celled. Flower-ſtalks radical, umbellate or whorled, the umbels and whorls encompaſſed with a three-leaved involucrum. Plants aquatic.—The genera are *Butomus*, *Damaſonium*, *Aliſma*, and *Sagittaria*.

4. Germens ſeveral (moſtly three). Capſules as many, ſingle-celled, ſometimes united at their baſe. Flowers pani-

cled or ſpiked.—Here we find *Nectris* of Schreber (*Cabomba* of Aublet), *Scheuchzeria*, *Triglochin*, *Narthecium* (*Tofieldia* of Hudſon and Smith), *Helonias*, *Melanthium*, *Veratrum*, and *Colchicum*.

This, nearly analogous to the *Tripetaloideæ* of Linnæus, is perhaps, on the whole, one of the leaſt correct of Juſſieu's orders. The order of *Junceæ*, extracted from it by *Decandolle* and *Brown*, is much better defined, in conſequence of the expulſion of *Reſtio* and its allies on the one hand, and *Commelina*, &c. on the other, with the removal of other genera to their proper places.

Junci *Lapidei*, in *Natural Hiſtory*, the name given by authors to a ſpecies of foſſile coral, of the tubularia kind, and compoſed of a congeries of ſmall tubules, which are uſually round and ſtriated within.

JUNCKER, Gottlob John, in *Biography*, a learned phyſician, was born on the 3d of June, 1680, at Londorff, near Gieſſen, in Heſſe. He purſued his medical ſtudies at Marpurg and Erfurt, and afterwards took the degree of M.D. at Halle, in the year 1718. He became ſubſequently a diſtinguiſhed profeſſor in this univerſity, and attained a high reputation as phyſician to the public hoſpital. He died at Halle, on the 25th of October, 1759. His works, which are chiefly compilations, have been much eſteemed, and are ſtill occaſionally referred to, eſpecially as they contain the beſt and moſt compendious view of the doctrines of Stahl, which he eſpouſed and taught. They are as follows: 1. "Conſpectus Medicinæ Theoretico-practicæ, Tabulis 137 primarios morbos, methodo Stahlianâ tractandos, exhibens," Halle, 1718, 4to.; – 2. "Conſpectus Chirurgiæ, &c." *ibid.* 1721, 4to.;—3. "Conſpectus Formularum Medicarum, &c." *ibid.* 1723, 4to.;—4. "Conſpectus Therapeiæ generalis, &c. Tabulis 20 methodo Stahlianâ conſcriptus," *ibid.* 1725, 4to.;—5. "Conſpectus Chemiæ Theoretico-practicæ in formâ Tabularum Repræſentatus, &c. Tomus prior." *ibid.* 1730, 4to. This is an elementary work on chemiſtry, according to the principles of Becher and Stahl.—6. "Conſpectus Phyſiologiæ," *ibid.* 1735, 4to.;—and 7. "Conſpectus Pathologiæ," *ibid.* 1736, 4to. Juncker likewiſe publiſhed many academical theſes on medical, chirurgical, and philoſophical ſubjects. Eloy. Dict. Hiſt.—Gen. Biog.

JUNCO, in *Geography*, a river of Africa, which croſſes the Grain Coaſt, and runs into the Atlantic; 90 miles E.S.E. of Cape Monte.

Junco, in *Ornithology*, the reed ſparrow. See Emberiza *Schoeniculus*.

Junco is alſo uſed by Bellonius for a bird, ſeeming, by his deſcription, the ſame with what we call the ſtint. See Tringa *Cinelus*.

JUNCTIN, Francis, in *Biography*, a mathematician of Florence, who flouriſhed in the ſixteenth century, and was for a time a Carmelite, but quitted his order, and going to France, abjured the Roman Catholic religion. He became a corrector of the preſs, and afterwards a manufacturer of paper, and a banker, by which avocations he gained a large fortune. He died about the year 1580. He was author of ſome arithmetical works, commentaries on the ſphere of Sacroboſco, on the Reformation of the Calendar, and on the age of the Loves of Petrarch.

JUNCTIONS. Among the Hindoos, junctions or meetings of many things are deemed holy and myſterious; more eſpecially the junctions of rivers. The junction of the day with night, the forenoon with the afternoon, &c. are duly reverenced, by ſtrict obſervers, with appropriate prayers and ceremonies; but the junction of rivers, above all, are very myſteriouſly contemplated. An act performed there, be it ever ſo good, is rendered vaſtly more ſo by this holy locality. Widows who burn themſelves with their huſbands' corpſe, always do it, where practicable, at the junction of two rivers: this horrid ſacrifice is called *Sati*, which ſee. As well as this ſpecies of meritorious ſuicide the Hindoos recognize ſome others, and if performed at the confluence of rivers the merit of the act is greatly enhanced.

"One of the holieſt ſpots of the Ganga (or Ganges) is where it joins the Yamuna (Jumna) below Delhi. A third ſacred river, the Saraſwati, is ſuppoſed to join them ſubterraneouſly, whence the junction is called *Triveni*, or the *three plaited locks*. Pilgrims here begin the ceremonies afterwards completed at Gàya. The confluence of rivers is a ſpot peculiarly dear to Hindoos; and this, more eſpecially of the Ganga and Yamuna, is ſo highly eſteemed, that a perſon dying there is confident of immediate beatitude, without riſk of farther tranſmigration Suicide is not only pardonable, but in ſome caſes meritorious with Hindoos. Cutting one's throat at the above holy junction, is, in reference to its immediate reſult, an inſtance of the latter. (See Suicide.) Widows who become *ſati*, or *pure*, by burning themſelves with the bodies of their deceaſed huſbands, which is generally done at the *ſangam*, or confluence of rivers, perform an act of meritorious ſuicide. And all acts in themſelves good, are rendered vaſtly better if done on ſuch a ſpot." Moor's Hindoo Pantheon.

JUNCTURE, any joint, or cloſing, of two bodies. See Joint.

Juncture, in *Oratory*, is a part of compoſition, particularly recommended by Quintilian, and denotes ſuch an attention to the nature of the vowels, conſonants, and ſyllables in the connection of words, with regard to their ſound, as will render the pronunciation moſt eaſy and pleaſant, and beſt promote the harmony of the ſentence. Thus the coalition of two vowels, occaſioning an hollow and obſcure ſound, and likewiſe of ſome conſonants rendering it harſh and rough, ſhould be avoided; nor ſhould the ſame ſyllable be repeated at the beginning and end of words, becauſe the ſound becomes hereby harſh and unpleaſant. The following verſe in Virgil's Æneid is an example of juncture:

> "Arma Virumque cano, Troja qui primus ab oris."

JUNCULAM, in *Geography*, a town of the iſland of Java, on the S.W. coaſt; 55 miles S.S.W. of Batavia. S. lat. 6° 40′. E. long. 105° 15′.

JUNCUS, in *Botany*, an old Latin word, *a jungendo*, ſay the etymologiſts, from the uſe of the plants which bear this name in joining or binding things together. The Ruſh.—Linn. Gen. 173. Schreb. 230. Willd. Sp. Pl. v. 2. 204. Mart. Mill. Dict. v. 2. Sm. Fl. Brit. 374. Brown. Prodr. Nov. Holl. v. 1. 258. Juſſ. 44. Tourn. t. 127. Lamarck Dict. v. 3. 263. Illuſtr. t. 250. Gærtn. t. 15. Claſs and order, *Hexandria Monogynia*. Nat. Ord. *Tripetaloideæ*, Linn. *Junci*, Juſſ.

Gen. Ch. *Cal.* Perianth of ſix oblong, pointed, permanent leaves, inferior. *Cor.* none. *Stam.* Filaments ſix, (in J. *conglomeratus* only three), capillary, very ſhort; anthers oblong, erect, the length of the perianth. *Piſt.* Germen ſuperior, pointed, triangular; ſtyle ſhort, thread-ſhaped; ſtigmas three, long, thread-ſhaped, downy, inflexed. *Peric.* Capſule inveſted with the calyx, triangular, of three more or leſs completely divided cells, with three valves, the partitions from their centre. *Seeds* various in number, rarely ſolitary, roundiſh.

Eſſ. Ch. Calyx of ſix leaves, permanent. Corolla none. Capſule ſuperior, of three valves, with one or three cells. Seeds ſeveral. Stigmas three.

The extenſive and very natural genus of *Juncus* is commodiouſly enough divided into two ſections; the firſt containing ſuch as have leafleſs ſtems, the ſecond thoſe with leafy ones. Of the former Willdenow reckons fifteen ſpecies, of the latter twenty-five. This author has judiciouſly enriched his ſtock by adopting thoſe indubitable, chiefly alpine, ſpecies, which Scheuchzer, Haller, Allioni and other alpine botaniſts had well defined, but which Linnæus had, rather incautiouſly, huddled together under his *piloſus* and *campeſtris*. His Syſt. Veg. ed. 14, contains only twenty-two in all. Lamarck has thirty-two. The *palleſcens* of the latter, omitted by Willdenow, is very diſtinct, though near *articulatus*, found at Buenos Ayres. Its flowers are much fewer together than in *nodoſus*, to which Lamarck ſuſpected it might belong. Mr. Brown has added nine New Holland ſpecies, previouſly nondeſcript, to the catalogue, and we believe America affords ſeveral more.

Eight Britiſh ſpecies are found in the firſt ſection, fifteen in the ſecond. Of the former may ſerve as examples,

J. *acutus*, Engl. Bot. t. 1614, a large and rigid ſpinous-pointed plant, found on ſome of our ſandy ſea-coaſts, but rarely.

J. *maritimus*, t. 1725, much more common, and found not only in clean ſand, but in muddy ſalt-marſhes alſo, confounded with the former by Linnæus, from which it differs in its more ſlender form, glaucous colour, and oblong capſules.

J. *conglomeratus*, t. 835, which is triandrous, and *effuſus*, t. 836, are both extremely common in moiſt places, as is *ſquarroſus*, t. 933, on the moſt dry and barren ſandy heaths.

The ſecond ſection, with leafy ſtems, is much more various and remarkable. In the beginning of it we find a tribe whoſe leaves are internally cellular, with tranſverſe partitions, ſo as to feel, and even to look, jointed. Theſe are ſcarcely yet well underſtood, eſpecially the American ones, to which the Linnæan *nodoſus* belongs. Thoſe of Britiſh growth have lately been well elucidated by the Rev. H. Davies in Tr. of Linn. Soc. v. 10. See Engl. Bot. t. 238, now called *acutiflorus*, t. 2143, *lampocarpus*, and t. 2144, *obtuſiflorus*, all confounded by Linnæus under his *articulatus*.—A more ſlender tribe ſucceed. J. *bulboſus*, t. 934, very improperly ſo called, from a bulbous-rooted ſpecies, J. *uliginoſus*, t. 801, whoſe ſynonym was once referred to it. J. *bufonius*, t. 802, with a very compound ſlender ſtem, is common in watery places, and rather extraordinary in its genus for having only an annual root. J. *gracilis*, t. 2174, a new Scottiſh ſpecies, reſembles it in general aſpect, but is not ſo much branched, nor ſo leafy.

J. *biglumis*, t. 898, *triglumis*, t. 899, and *caſtaneus*, t. 900, are three rare and curious mountain kinds, the firſt in particular, a Lapland plant, extremely uncommon in Britain, and ſcarcely well known by ſome of our beſt botaniſts. It may however always be diſtinguiſhed from two-flowered ſpecimens of *triglumis*, by the flowers being placed one above another, not in the ſame plane.

The genus finiſhes with another very diſtinct tribe, whoſe copious broad leaves, and more or leſs panicled numerous flowers, with a ſhining brown, yellow, or brilliant white calyx, give their leading characters. Of theſe are the common J. *piloſus*, Engl. Bot. t. 736; the more rare J. *Forſteri*, t. 1293; the great *ſylvaticus*, t. 737 (Willdenow's *maximus*); the beautiful *luteus* of Allioni, Villars Dauph. t. 6, common on the alps of Switzerland, Savoy, &c.; the elegant *niveus* found on the mountains of Italy, Switzerland, and ſome parts of Germany; and our common *campeſtris*, Engl. Bot. t. 672.

JUNDGEH, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 16 miles W. of Kintaja.

JUNDOO, a town of Bengal; 5 miles S. of Ghidore.

JUNE, the ſixth month of the year, during which the ſun enters the ſign of Cancer. The word comes from the Latin *Junius*, which ſome derive *a Junone*. Ovid, in the ſixth of his Faſti, makes the goddeſs ſay,

> "Junius a noſtro nomine nomen habet."

Others rather derive it *a junioribus*, this being for young people, as the month of May was for old ones.

> "Junius eſt juvenum, qui fuit ante ſenum."

In this month is the ſummer ſolſtice.

JUNERE, or JENCAGHUR, in *Geography*, a town of Hindooſtan, in the country of Baglana; 122 miles W.S.W. of Aurungabad. N. lat. 19° 11′. E. long. 73° 59′.

JUNES, EL, a town of Morocco; 15 miles N.E. of Azamor.

JUNGDRAWBERG, a town of Pruſſia, in the palatinate of Culm; 20 miles S. of Dantzic.

JUNGERBAD, a town of Hindooſtan; 35 miles W. of Benares.

JUNGERMANNIA, in *Botany*, a cryptogamic genus of plants, very numerous in ſpecies, as well as diſtinct in character, named by Ruppius and Micheli, who have been followed by all botaniſts ſince, in honour of Lewis Jungermann, Profeſſor of Botany at Altdorf, and afterwards at Gieſſen, in the early part of the ſeventeenth century. He wrote catalogues of the wild plants found near thoſe towns, as well as near Leipſic, his native place, and Frankfort on the Maine. Haller ſays he left a fine *hortus ſiccus* of two thouſand plants, which is ſtill preſerved at Altdorf. Of him it may juſtly be ſaid, that the genus in queſtion has preſerved his name, rather than his merits, from oblivion; for thoſe to whom it is familiar, commonly rather wonder than take any pains to inquire, who Jungermann was. Linn. Gen. 564. Schreb. 764. Mart. Mill. Dict. v. 2. Mich. Gen. 6. t. 5. Hedw. Theor. 83. t. 22, 23. Schmidel. Monogr. ann. 1760. cum tab. Juſſ. 8. Lamarck Dict. v. 3. 278. Illuſtr. t. 875. (Lichenaſtrum; Dill. Muſc. 479. t. 69—74.) Claſs and order, *Cryptogamia Algæ*, Linn. *C. Hepaticæ*, Schreb. Nat. Ord. *Algæ*, Linn. *Hepaticæ*, Juſſ.

Gen. Ch. Male, *Cal.* and *Cor.* none. *Stam.* Anthers aggregate, of an indeterminate number, in powdery heads, which are either ſtalked, ſeſſile, or immerſed in the ſubſtance of the frond.

Female on the ſame (rarely on a ſeparate) plant. *Cal.* Perianth erect, tubular, truncate, variouſly crenate or jagged. *Cor.* Veil membranous, ſeſſile, ſmaller than the perianth, ſomewhat globoſe, cloſed on all ſides, crowned with the ſtyle, at length burſting at the top. *Piſt.* Germen oblong, ſeſſile, encloſed in the veil; ſtyle ſolitary, cylindrical, terminating the veil; ſtigma abrupt, tubular. *Peric.* Capſule elevated on a long, fleſhy, very tender, pale, ſimple, cylindrical ſtalk, globoſe, of one cell, at length burſting into four equal, permanent valves, ſpreading in the form of a croſs. *Seeds* very numerous, globular, adhering by ſpiral elaſtic fibres to the baſe, ſummit, diſk or margin of the valves.

Obſ. Several germens are often found in one perianth, though only one of them comes to perfection, the others withering at the baſe or ſides of its veil.

Eſſ. Ch. Male, Anthers aggregate, in powdery heads. Female, Capſule of four valves, on a ſtalk riſing from a tubular calyx. Seeds attached to elaſtic filaments.

Nothing can be more elegant than the general habit of this genus, which is, in a manner, intermediate between the true Moſſes, or *Muſci*, and the other *Hepaticæ* and *Algæ*. It is throughout highly vaſcular or cellular, exhibiting the appearance of fine internal reticulations, as in *Hookeria* and ſome other moſſes; but the texture is commonly more tender and ſucculent than in that family. Some ſpecies emit an aromatic fragrance, like that of red cedar wood, very perceptible and delightful in groves, or the ſhady walks of gardens. The capſule is eſſentially different from that of the true moſſes, in having no *operculum* or lid; but the ſingular character of the ſtyle terminating the veil, or corolla, is proper to both. Great ambiguity occurs in the botanical deſcriptions of the various ſpecies, from Linnæus having termed the whole plant a frond, though he often inadvertently calls its ſegments leaves, *folia*, and ſpeaks of the *ſtem*, as if the plant were a real *herba*, as in the *Muſci*. On this ſubject the writer of the preſent article has long been at a loſs to form a decided opinion, and in the deſcriptions of many *Jungermanniæ* in *Engliſh Botany*, has given into the practice of Schreber and others, who uſe the terms leaves and ſtipulas, for what, according to the original Linnæan principle, are ſegments of the frond, leaflets, or ſcales. On mature deliberation, however, it ſeems beſt to keep rigidly to this laſt-mentioned principle. The ſtalks, and the leaflets, or ſegments of the fronds, will always be found homogeneous and inſeparable. The apparent leaves are never thrown off like the real leaves of other plants, but are of one ſubſtance with the part that bears them. The *Jungermanniæ acaules*, which conſtitute the laſt ſection of the genus, as *epiphylla*, Hedw. Theor. t. 21—23; *pinguis*, Engl. Bot. t. 185; *multifida*, t. 186, &c. have to all intents and purpoſes real fronds, not ſtems and leaves; and it would be offering great violence to nature to ſuppoſe ſome ſpecies of a genus to be frondoſe and others herbaceous. Some German writers indeed cut this gordian knot, by aboliſhing the term frond altogether; but againſt ſuch a meaſure we muſt put in our decided proteſt. (See FROND.) Little difficulty will ariſe from calling the ſegments leaflets inſtead of leaves. and what have been termed ſtipulas, may, by the analogy of ferns, be ſafely named ſcales, *ſquamæ*. In Engl. Bot. v. 31. p. 2231, we have ſuggeſted the propriety of terming the larger half of the leaflet, (in thoſe ſpecies uſually known by the appellation of auricled,) in Latin *lobus*, and the ſmaller one, or auricle, *lobulus*. This will be found very commodious in conſtructing neat ſpecific characters. In Engliſh *leaflet* and *ſide-lobe* will be equivalent to thoſe terms.

On all theſe particulars, and others, we have had frequent conſultation with our able friend Mr. W. J. Hooker, whoſe attention to this genus has been very deep and minute, and who has undertaken to illuſtrate the Britiſh ſpecies in particular, with excellent figures and deſcriptions.

Our native ſpecies amount to above 60, though Hudſon has but 30. The foreign ones are very numerous, but the greater part remain undeſcribed, except what profeſſor Swartz has given in his *Prodromus*. Mr. Archibald Menzies collected, at the Cape of Good Hope, Staten Land, the weſt coaſt of North America, and eſpecially at Duſky bay, in New Zealand, a profuſion of new and magnificent ſpecies, of which he has favoured us with ſpecimens, but he reſerves to himſelf their deſcription, which is anxiouſly expected by his friends. It is preſumed that 150 *Jungermanniæ* might eaſily be reckoned up. Linnæus's Syſt. Veg. ed. 14, has but 33 in all, but his herbarium contains many more. Dillenius was the firſt who laboured with much ſucceſs to explain the ſpecies of this genus, though Micheli alſo beſtowed no ſmall pains upon them, but his figures are, in this inſtance, not very expreſſive. Schmidel, in his *Icones*, has illuſtrated a few ſpecies ſo amply and accurately as to leave nothing to be wiſhed. It is but juſtice to Mr. Sowerby to ſay, that the plates he has given of *Jungermanniæ*, in Engl. Bot. are as characteriſtic as moſt botanical figures of any kind.

A natural diſtribution of the ſpecies is ſtill wanting. Linnæus divides them into five ſections.

1. *Fronds pinnate; leaflets turned to one ſide.* Of this the common *J. aſplenioides*, Engl. Bot. t. 1788, and *bidentata*, t. 606, are examples.

2. *Fronds pinnate; leaflets with auricles, or ſtipulas (rather ſcales), beneath.*

See *J. nemoroſa*, t. 607, which has auricles (ſide-lobes) and *reptans*, t. 608, which has ſcales.

3. *Fronds imbricated.*

Under this head are arranged *tamariſcifolia*, t. 1086, *ciliaris*, t. 2241, and ſome other very fine ſpecies.

4. *Shoots imbricated on all ſides, the leaflets ſcattered.*

To this belong *concinnata*, t. 2229, and *trichophylla*, t. 2252. *J. rupeſtris* and *alpina* are properly eſtabliſhed as a genus of real *Muſci* by Ehrhart, under the name of *Andreæa*, *Andræa* of Fl. Brit. 1178. Engl. Bot. t. 1277, 1278, and 2162, and Hooker in Tr. of Linn. Soc. v. 10. 381.

5. *Without a ſtem, the fronds being ſimple.*

To this, as we have already ſaid, belong *epiphylla*, *pinguis*, and *multifida*.

The intelligent reader will eaſily perceive the inſufficiency and inaccuracy of theſe ſubdiviſions, and the neceſſity of better. The difficulty lies in finding technical characters to mark natural ſections. It is eaſy enough to arrange any natural objects by ſuch characters artificially, without regard to their real affinities. S.

JUNGEVSKOI, in *Geography*, a town of Ruſſia, in the government of Toboliſk; 56 miles S. of Kemſkoi.

JUNGFRAU (probably from the Celtic *Jun-fra*, *i. e.* a place from which water deſcends), a mountain in the canton of Bern, in Switzerland, which, according to profeſſor Tralles's trigonometrical ſurvey, riſes 12,852 feet above the level of the ſea, and affords a ſpectacle, the ſublime beauty of which is ſcarcely equalled by any other object of nature in the Alps. The middle part of this ſtupendous maſs is more generally known by the above name; the cuneiform rock towards the right hand (when viewed from the Pletſch mountain) is called the *Monk*, and the ſummit, covered by eternal ſnows, is called the *Jungfrau-horn*. The valley of Lauterbrunn, at the foot of this mountain, is too confined to allow the eye to ſeize the whole grandeur of the object before it; but from the neighbouring Pletſch mountain it may be ſeen to the greateſt advantage, together with the vaſt groups of other craggy mountains and glaciers with which it is connected.

We read in an article from Bern, in the Moniteur of 25th Aug. 1811, that, in the beginning of that month, two Swiſs gentlemen have ſucceeded in aſcending the ſummit of this ſtupendous mountain, an undertaking which, hitherto, has been deemed impracticable. After having ſpent three days and four nights on the ſnow and ice, and made ſome fruitleſs attempts, they have ſeen their endeavours crowned on the 3d of Auguſt, when they reached the ſummit, where they fixed a black flag. They intend publiſhing an account of this remarkable journey.

JUNGFRUN, Stron, a ſmall iſland, about ſix miles in circuit, on the W. ſide of the gulf of Bothnia; it is high and rocky, and dangerous to navigators. N. lat. 61° 10′. E. long. 17° 10′.

JUNGFRUN, *Lill*, another ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 61° 16′. E. long. 17° 9′.

JUNGHERAH, a ſmall iſland in the river Ganges, on which is a ſeminary of Hindoo mendicants; 12 miles from Boglipour.

JUNGIA, in *Botany*, ſo named by the younger Linnæus, in memory of Joachim Jungius, a learned German botaniſt of the 17th century. (See JUNGIUS.) Linn. Suppl. 58. Schreb. 589. Willd. Sp. Pl. v. 3. 2391. Mart. Mill. Dict. v. 2. Juſſ. 175.—Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinarocephalæ anomale*, Juſſ.

Gen. Ch. *Cal.* Common perianth of many, ſomewhat ſpreading, linear, obtuſe, channelled leaves, containing three or four flowers: partial longer, many-flowered, of many, nearly equal, oblong, channelled, obtuſe, erect leaves. *Cor.* compound, of uniform, hermaphrodite, equal florets: partial of one petal, funnel-ſhaped; the tube dilated upwards; limb of two lips; the outer longeſt, revolute, linear, toothed at the extremity; inner deeply divided into two ſmall, erect, acute ſegments. *Stam.* Filaments five, very ſhort, inſerted into the tube of each floret; anthers united into a cylinder. *Piſt.* Germen inferior, linear, angular; ſtyle thread-ſhaped; ſtigmas two, revolute, obtuſe. *Peric.* none, except the unaltered calyx. *Seeds* ſolitary, angular. *Down* long, ſeſſile, feathery. *Recept.* clothed with ſcales, reſembling the leaves of the calyx.

Eſſ. Ch. Receptacle chaffy. Common perianth containing three flowers. Florets tubular, two-lipped; the outer lip ligulate; inner deeply divided.

1. *J. ferruginea.* Linn. Suppl. 390. Gathered by Mutis, or ſome of his pupils, in New Granada. A *tree* or *ſhrub*, whoſe branches are round, clothed with ſoft down, of a ruſty hue, at leaſt in the dried ſpecimen. *Leaves* alternate, remote, ſtalked, flat, rounded, bluntly five-lobed; heart-ſhaped at the baſe; hairy on both ſides; lighter coloured beneath. The only leaf we have ſeen is two inches in diameter, but there is reaſon to think the lower ones may be much larger. *Footſtalks* downy and ruſty. *Panicle* terminal, large, repeatedly branched with downy ſtalks. *Flowers* in roundiſh cluſtered heads. *Florets* purple, encompaſſed with the long white down of the ſeed.

This plant is known in Europe by the ſingle ſpecimen in the Linnæan herbarium only, nor has any figure of it appeared.

JUNGILE, in *Geography*, a town of Hindooſtan, in Benares; 20 miles S. of Bidzigur.

JUNGIPOUR, a town of Hindooſtan, in Bengal, where the Eaſt India Company have a factory for raw ſilk; 20 miles N. of Moorſhedabad.

JUNGIUS, JOACHIM, in *Biography*, an eminent mathematician, phyſician, and botaniſt, the ſon of a ſchoolmaſter at Lubec, in Germany, was born on the 21ſt of October 1587. His mother was daughter to a clergyman of the cathedral church at Lubec. Jungius having unfortunately been deprived of his father very early in life (for he was ſtabbed one evening upon his return home from a convivial party), and being left with a ſlender patrimony, was obliged to depend almoſt entirely upon his own exertions for whatever knowledge and information he was anxious to acquire, the narrowneſs of his circumſtances not enabling him to paſs through the uſual routine of a learned and philoſophical education. Notwithſtanding this obſtacle, we are informed that, in his youth, he became a very ſubtle logician, and ingenious diſputant. By a cloſe attention to ſuch ſtudies he prepared his mind for that clearneſs of inveſtigation and accuracy of judgment, which were ſo eminently conſpicuous in the works which he publiſhed at a more advanced period of his life. Selecting the ſtudy of medicine as a profeſſion, he travelled, at the age of 30, over a great part of Italy, and viſited many of the principal places in Germany. His great object in travelling was to become acquainted with ſome of the moſt diſtinguiſhed phyſicians of that time, from whoſe company and converſation he hoped to derive much amuſement and inſtruction. He had previouſly graduated at the univerſity of Gieſſen A. D. 1607, at which time he was ranked firſt among his competitors in the liſt of honours, and he remained there a few years in the capacity of mathematical tutor. In 1624 he married Catharine, the daughter of Valentine Haſſeman, a reſpectable citizen of Roſtock, in Lower Germany, by whom he had no iſſue. She died in 1638, from which period he remained a widower. He had been choſen profeſſor of phyſic at Helmſtadt in 1625, which had led him to remove from Roſtock; but, on account of the Daniſh war, he was obliged, ſoon after his appointment, to fly to Brunſwick, where he reſided for a ſhort time, and practiſed as a phyſician. However, he ſoon returned to Helmſtadt, till, in 1629, he was appointed rector of the ſchool at Hamburgh.

Jungius ſeems to have eminently diſtinguiſhed himſelf in the ſeveral ſtudies of theology, medicine, mathematics, metaphyſics, and botany, upon all which purſuits his opinions and obſervations are handed down to us in his writings, though the moſt famous part of his work, entitled "Doxoſcopiæ Phyſicæ Minores," is upon the laſt mentioned ſubject, botany. This book was firſt printed at Hamburgh, in 4to. A.D. 1662, and again, in 1679, under the care of Martin Fogel, with this additional title, "Præcipuarum opinionum phyſicarum." A copy of the former edition of this work is in the Linnæan library, having been preſented to Linnæus by his pupil, profeſſor P. D. Giſeke, of Hamburgh. The botanical part of it, included in the third ſection of the ſecond part, occupies about 100 pages. Here are to be found many judicious and acute rules for making diſtinct ſpecies of plants, as well as ſome curious remarks upon genera. Profeſſor Jungius was alſo the firſt author who contended that trees cannot with propriety be ſeparated from other plants with reſpect to their claſſification, though the honour of having firſt ſtarted this idea is often beſtowed upon Rivinus, for till this time trees had been regarded as a ſuperior kind of productions in the vegetable kingdom. Jungius preferred the diſcriminative marks afforded by the herbage in general, *viz.* the leaves, ſtalks, and flower-cups of plants to thoſe which are taken from colour, taſte, or ſmell. He was a great critic in botanical nomenclature; and conſtructed a variety of terms which agree with thoſe of Linnæus. Many ſpecies of plants were judiciouſly ſeparated and determined by him, which had before been entirely miſplaced or confuſedly arranged. He moreover detected the ſeed of certain plants which, till his time, were ſuppoſed to have been deſtitute of ſeed, eſpecially in the genus *Salix*. His remarks upon botanical diſcrimination have been of conſiderable advantage to ſucceeding botaniſts, and many of his definitions are repeatedly made uſe of by our immortal countryman, Ray. What further teſt of his abilities is requiſite? It has been ſaid, with a view to detract from the fame of Linnæus, that the works of our author furniſhed him with many hints which he never acknowledged; but this is ſcarcely poſſible, for though their ideas accord in many points, yet there is reaſon to believe that Linnæus never ſaw the writings of Jungius till long after his own were publiſhed.

Much credit is due to the ſubject of our memoir for having been the firſt who projected and raiſed a literary ſociety in

Germany, though this inſtitution did not ſhare a better fate than the one which had juſt before been found in this country (and which appears to have ſerved for its model) by Hugh Latimer, Thomas Linacre, and others, for the purpoſe of diſcuſſing and illuſtrating Ariſtotle's philoſophy. They both flouriſhed but for a ſhort period, though the Heunetic or Ereunetic ſociety, as it was called, eſtabliſhed by profeſſor Jungius, was on a far more comprehenſive plan than the other, and may indeed be conſidered as having, in ſome meaſure, embraced the ſame views with which the Royal Society was afterwards inſtituted in Great Britain. The fame of Jungius was originally diffuſed through this country by his noble pupil, the honourable Charles Cavendiſh, who appears to have ſtudied under him at Hamburgh. This gentleman was brother to the earl of Newcaſtle, who had the care of Charles I. when a youth.

After a long life, ſpent in the acquirement and diffuſion of general philoſophical knowledge, and having always manifeſted a ſtrong attachment to the Lutheran church, profeſſor Jungius departed this life on the 23d of September 1657, at the age of 70 years, and was buried in the church of St. John at Hamburgh, where a handſome tablet was inſcribed to his memory by his friend and pupil, Michael Kirſten. The following is a liſt of his works, as given by Martin Fogel, who edited the ſecond edition of his "Doxoſcopiæ."

Logica Hamburgenſis. Hamb. 1638, in 8vo.

Geometria Empirica. Roſtock. ſemel et Hamb. bis, in 4to.

Doxoſcopiæ Phyſicæ Minores, ſine Iſagoge Phyſica Doxoſcopica. Hamb. 1662, in 4to.

Kurzer Bericht von der Didactica oder Lehrkunſt Wolfgangi Ratichii, durch Chriſtoph. Helvicum und Joach. Jungium. Gieſſen, 1614, in 4to.

Diſputationes de naturali Dei cognitione: de potentiâ activâ: de loco Ariſtotelis, lib. 3. de cœlo, t. 66: de figuris locum replentibus: de relationibus: de notionibus ſecundis: de demonſtratione tritermina: de definitionibus, &c.

Haller's Bibl. Bot. Witten. Memoriæ Philoſophorum, Franckfort, 1679.

JUNGKEN, John Helfric, a phyſician, was born at Kalern, in Heſſe, in December 1648, and was diſtinguiſhed by his abilities during his early ſtudies. He purſued his medical education at Marpurg and at Heidelburg, and took the degree of doctor at the latter univerſity in 1671. After this period, he ſpent many years in travelling in purſuit of knowledge, and finally ſettled at Frankfort on the Maine in 1689, and was appointed phyſician to the public hoſpital there in 1693. He obtained a high reputation and a moſt extenſive practice, in the courſe of which, however, he publiſhed ſeveral works. He died, greatly regretted, on the 5th of January, 1726. His writings are now ſeldom referred to, and it will be unneceſſary here to detail the long titles of them. They treated of every branch of the profeſſion, but chiefly on chemiſtry and pharmacy; and his pathology was founded on the mathematical doctrines, eſpecially thoſe of Deſcartes. Eloy. Dict. Hiſt.

JUNGLEBARRY, in *Geography*, a town of Bengal; 50 miles N. of Dacca.

JUNGNAU, a town of Germany, and capital of a lordſhip belonging to the princes of Furſtenberg; 14 miles W. of Buchau.

JUNCS Hound, or *Head*, a cape of Denmark, on the E. coaſt of the iſland of Zealand. N. lat. 53° 7'. E. long. 12° 11'.

JUNIATTA, a town of America, in Pennſylvania, 5 miles W.N.W. of Huntingdon.—Alſo, a river of Pennſylvania, which riſes from two ſprings in the Allegħany mountains, and runs into the Suſquehannah, 15 miles N.W. of Harriſburg.

JUNIEU, St., a town of France, in the department of the Upper Vienne, and chief place of a canton, in the diſtrict of Rochechouart; 15 miles W. of Limoges. The place contains 6046, and the canton 12,519 inhabitants, on a territory of 170 kiliometres, in ſeven communes. N. lat. 45° 53'. E. long. 9° 5'.

JUNIOW, a town of Poland, in the palatinate of Braclaw; 52 miles N. of Braclaw.

JUNIPA, in *Botany*, the name of a tree of the Caribbee iſlands, and ſome other places, the fruit of which is ſaid to yield a juice as clear as water, yet yields a fine violet-coloured dye, and being rubbed twice on the ſame place, makes it black. This tincture, it is ſaid, cannot be got out by ſoap, or any other method of cleanſing, but after nine or ten days diſappears of itſelf. It is ſaid alſo, by the ſame authors, that hogs and parrots, feeding on this fruit, have their fleſh and their fat all tinged throughout of a violet colour.

JUNIPERUS, an ancient Latin name, of whoſe meaning or derivation no account is given.—Juniper. Linn. Gen. 531. Schreb. 705. Sm. Fl. Brit. 1085. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 3. 413. Tournef. t. 361. Juſſ. 413. Lamarck. Illuſtr. t. 829. Gærtn. t. 91.—Claſs and order, *Diœcia Monadelphia*. Nat. Ord. *Coniferæ*, Linn. and Juſſ.

Gen. Ch. Male, *Cal.* Catkin conical, conſiſting of a common receptacle, bearing three rows of three flowers each, with a terminal one; the baſe of each flower is a broad, ſhort, incumbent ſcale fixed by a ſtalk to the common receptacle. *Cor.* none. *Stam.* Filaments (in the terminal flower) three, awl-ſhaped, united below into one body (in the lateral flowers ſcarcely perceptible); anthers three, diſtinct in the terminal flower, but in the lateral ones attached to the baſe of each ſcale.—Female, *Cal.* the ſcales of a catkin, fewer, imbricated, the upper ones at length fleſhy and permanent. *Cor.* none. *Piſt.* Germens three, imbedded in the uppermoſt ſcales; ſtyles three, ſimple; ſtigmas ſimple. *Peric.* Berry fleſhy, roundiſh, marked in the lower part with three, oppoſite, obſolete tubercles, the points of the coaleſced ſcales, and at the top umbilicated with three teeth. *Seeds.* Nuts three, oblong, convex on one ſide, angular on the other; abounding with cells of turpentine on the outſide.

Eſſ. Ch. Male, Calyx-ſcales of a catkin. Corolla none. Stamens three.—Female, Calyx-ſcales of a catkin, fewer, at length pulpy, united into a berry with three ſeeds.

1. *J. communis.* Common Juniper. Linn. Sp. Pl. 1470. Engl. Bot. t. 1100. Woodv. Med. Bot. t. 95.—Leaves three together, ſpreading, tipped with a ſpine, and longer than the ripe fruit.—A native of open, hilly places on a calcareous ſoil, flowering in May, though by no means a common plant in Britain.—This *ſhrub* is generally of humble growth, much branched, rigid, ſmooth, evergreen. *Juice* of the whole plant a kind of turpentine. *Wood* hard and durable. *Leaves* oppoſite, acerofe, channelled, ſharp-pointed, glaucous above. *Catkins* diœcious, axillary. *Berry* globoſe, dark-purple, covered with a glaucous dew, ſweetiſh and aromatic.—The alpine variety β is more humble in its growth, and more depreſſed, having broader *leaves* and rather oblong *berries*.—The bark of juniper is frequently converted into ropes, and it is well known that ſpirits, when impregnated with the eſſential oil of its berries, become Juniper water, or Gin.—Linnæus obſerves, in his *Flora Lapponica*, n. 376, that the Laplanders drink infuſions of the Juniper-berries, as we do tea and coffee, and that the

Swedes prepare a beverage from them in great eſtimation for its diuretic and antiſcorbutic qualities.—There is reaſon to preſume that the Swediſh variety of this ſhrub, which is much taller and more arboreſcent than our's, may be a diſtinct ſpecies.

Linnæus enumerates nine ſpecies of this genus, and profeſſor Martyn eleven, the moſt remarkable of which are the following.—*J. Oxycedrus*, the brown-berried Juniper, a native of Spain, the ſouth of France, and the Levant.—The wood of this ſpecies is ſuppoſed to have been the famous cedar of the ancients, celebrated for its durability, of which ſome of their firſt ſtatues were made, before the uſe of marble in this branch of art was known.—*J. virginiana*, a native of North America, the Weſt India iſlands, and Japan.—The wood of this tree is celebrated for its very powerful fragrance, and for reſiſting the attacks of inſects, being the well-known red cedar, uſed for lead pencils, and formerly in great requeſt for wainſcotting, and cabinet-work. Large trees of it are not uncommon in the older gardens and ſhrubberies of this country.—*J. bermudiana* is alſo a hardy tree with us. It is ſuſpected that more ſpecies than one have been confounded under this or the laſt.—*J. ſabina*, the common Savin, a native of the ſouth of Europe, is ſufficiently well known, and is a popular medicine in ſome female complaints, being alſo ſuppoſed to be powerfully capable of procuring abortion. It is commonly of humble growth, but ſometimes forms a handſome dark evergreen buſh three or four feet high. In Greece it is ſaid to become a tree like a cypreſs, with a trunk a foot in diameter. Botaniſts are by no means correctly verſed in the ſpecies of this genus, or the varieties to which they are ſubject.—*J. Lycia*, is with difficulty diſtinguiſhed from the laſt; its ſhoots are however ſomewhat thicker, and its leaflets more acute and leſs cluſtered. It is a native of the ſouth of France and the Levant.—The gum-reſin *Olibanum*, of a ſtrong ſmell, and bitteriſh pungent taſte, is extracted from the Lycian cedar, and is ſuppoſed to have been uſed by the ancients in their ſacrifices, being ſtill employed in Catholic countries in their religious ceremonies, as incenſe.

JUNIPERUS, in *Gardening*, comprehends plants of the evergreen tree and ſhrub kinds, of which the ſpecies generally cultivated are, the common juniper (J. communis); the brown-berried juniper (J. oxycedrus); the Spaniſh juniper (J. thuſifera); the Barbadoes juniper (J. barbadenſis); the Bermudas juniper (J. bermudiana); the ſavin (J. ſabina); the Virginian juniper, or red cedar (J. virginiana); the Phœnician juniper, or cedar (J. phœnicea); and the Lycian juniper, or cedar (J. lycia).

The ſixth ſpecies has a variety with variegated leaves.

And the ſeventh ſpecies affords the Swediſh or tree juniper, which riſes to a very conſiderable height. Alſo the alpine or mountain juniper, which has the leaves broader and thicker, and the berries of a rather oval ſhape.

Method of Culture.—All theſe plants, except the fifth ſort, may be increaſed either by ſeeds, layers, or cuttings; the latter methods are proper for the ſavin kinds.

The ſeeds or berries ſhould be ſown in beds of light earth, in the early autumn or ſpring, but the former is the better in light ſoils, in a warm ſheltered ſituation, in the open ground, being well raked in. The beds ſhould be kept perfectly clear from weeds, and the young plants be occaſionally watered during the ſummer ſeaſon. When the plants have had two years growth in theſe beds, and are become ſtrong, they ſhould be removed into nurſery rows at two feet apart, and a foot or eighteen inches diſtant in the rows. They ſhould remain in theſe ſituations till of proper growth to be planted out where they are to remain.

The layers of the young branches ſhould be laid down at either of the above ſeaſons, and, when well rooted, taken off, and planted in the nurſery, in the ſame manner as the ſeedling plants.

The cuttings ſhould be made from the young branches, and be planted in a ſhady border, in the latter end of ſummer, watering them occaſionally till they have taken good root; when they may be taken up with earth about their roots, and be managed in the ſame manner as by the other methods.

The plants raiſed in theſe laſt ways ſeldom grow ſo upright, or to ſo large a ſize, as in the ſeed method.

The common upright and ſtriped ſavins may likewiſe be increaſed by planting ſlips of the young branches; for the laſt ſort the moſt variegated being made uſe of, in the latter end of ſummer, or in the autumn, in a ſhaded border, due water being given. When the plants are come up, they muſt be managed as the other ſorts.

The fifth ſort muſt be ſown in pots or tubs, at the ſame ſeaſons as the other ſorts, being placed in a frame to have the protection of glaſſes when the weather is froſty and ſevere. As the ſeeds are long in coming up, the mould in the pots, &c. muſt remain undiſturbed till they appear, being ſhaded from the ſun, and ſlightly watered occaſionally. The young plants ſhould be kept quite free from weeds, and be duly watered till they have attained ſufficient growth to be removed into ſeparate ſmall pots, filled with light earth, which is generally when from one to two years old. In removing them, they ſhould have balls of earth preſerved about their roots, and be watered, and placed in a warm ſituation. The beſt ſeaſon for this is in the early ſpring: but it is of great advantage to plunge the pots in a mild hot-bed. They muſt be protected in the winter, either in frames, or under a warm fence; the pots being plunged in the earth. When they have been removed into different larger pots, till of ſufficient large growth, they may be planted out where they are to grow, which ſhould be in a warm ſituation. It is proper to ſhelter them the firſt two winters during ſevere froſts, by mats, or other ſimilar coverings.

The proper periods for removing all the different ſorts into the open ground are in the early autumn or ſpring months.

Theſe plants all ſucceed in the open ground, and grow in any common ſoil and ſituation, with other hardy plants of the tree kind; though they are the moſt proſperous in a light ſandy ſoil, where the aſpect is ſheltered.

In placing theſe kinds of plants in the clumps and ſhrubbery plantations, attention ſhould be had to arrange them according to their degrees of growth, ſo as to exhibit a regular gradation of height; placing the low growing ſorts, as the common juniper and ſavin kinds, towards the fronts, and the other larger growing ſorts more backwards, in aſſemblage with other ornamental ſhrubs and trees of the evergreen tribe; and ſome may be placed as ſingle ſtandards, on open ſpaces of ſhort graſs, in the pleaſure ground quarters. Some of the large growing ſorts may alſo be introduced into the foreſt-tree plantations, as they have a fine effect, and afford excellent timber for many uſes, more particularly the Virginia cedar, which arrives at a conſiderable ſize, eſpecially when the under branches are trimmed off occaſionally while young.

JUNIPERUS, in the *Materia Medica*. The tops and fruit or berries of the ſhrub juniperus, which is common on heaths in different parts of Europe, are much uſed in medicine; but the latter are preferred.

Theſe berries, which are firſt green, and when ripe of a dark purple colour, ripen in the autumn. They are chiefly brought to us from Holland and Italy; and ſhould be choſen freſh, not much ſhrivelled, and free from mouldineſs. Their ſmell is moderately ſtrong, but not diſagreeable, and their taſte is warm, pungent, and ſweetiſh, which, after they have been long chewed, or previouſly well bruiſed, is followed by a conſiderable degree of bitterneſs. The ſweetneſs of theſe berries appears to reſide in the juice, or ſoft pulpy part; the bitterneſs in the ſeeds; and the aromatic flavour in oily veſicles, ſpread throughout the ſubſtance, both of the pulp and of the ſeeds, and diſtinguiſhable even by the eye. The freſh berries yield, on expreſſion, a rich, ſweet, honey-like, aromatic juice; and if the ſeeds are thoroughly broken, the juice proves tart and bitter.

Juniper berries give out nearly all their virtue, both to water and rectified ſpirit, tinging the former of a browniſh-yellow, and the latter of a bright orange colour. Diſtilled with water, they yield a yellowiſh eſſential oil, very ſubtile and pungent, reſembling the berries in ſmell, and in quantity, when the berries have been ſufficiently bruiſed, about one ounce from forty. This oil is a very ſtimulating diuretic; the decoction inſpiſſated to the conſiſtence of a rob or extract, has a pleaſant, balſamic, ſweet taſte, with a greater or leſs degree of bitterneſs. A part of the flavour of the berries ariſes alſo in diſtillations with rectified ſpirit: the inſpiſſated tincture conſiſts of two diſtinct ſubſtances; one oily and ſweet; the other tenacious, reſinous, and aromatic. The extract may be uſed with advantage in caſes where the more ſtimulating preparations would be improper; as in catarrhs, debilities of the ſtomach and inteſtines, and difficulties of the urinary excretions, in perſons of an advanced age. Among the aromatics that have been tried in compoſition with juniper berries, ſweet fennel ſeeds, and carraway ſeeds, ſeem the beſt adapted to improve their flavour. A cordial water is prepared in the ſhops, by drawing off a gallon of proof-ſpirit from a pound of the berries, and an ounce and a half of each of the ſeeds. To this water may be uſefully ſuper-added, a proper quantity of the rob. Lewis.

The berries are chiefly uſed for their diuretic effects; and they are alſo conſidered to be ſtomachic, carminative, and diaphoretic. We have ſeveral teſtimonies in favour of the efficacy of juniper berries in many hydropical affections by phyſicians of great authority; but authors do not ſeem to be perfectly agreed which preparation of the juniper is moſt efficacious; many preferring the rob or inſpiſſated decoction; but Dr. Cullen obſerves, that this is an inert medicine, alleging that to the eſſential oil, which is much the ſame as that of turpentine, only of a more agreeable odour, he thinks all the virtues aſcribed to the different parts of juniper are to be referred. Hoffman, on the contrary, ſtrongly recommends the rob, and declares it to be of great uſe in debility of the ſtomach and inteſtines; and he found it to be particularly ſerviceable to ſuch old people as are ſubject to theſe diſorders, or labour under a difficulty with regard to the urinary excretion; whence it appears, that the berries retain medicinal powers, though deprived of the medicinal effects of the eſſential oil. Van Swieten preſcribed the following formula: ℞. Rob. bacc. junip. ℥ii; dilue in aqua junip. ℔ii; add. ſpirit. bacc. junip. ℥ii; quandoque ſpiritus nitri dulcis ℥ß ad ſitim ſedandam additur. Of this mixture one or two ounces were given every three hours. But juniper being now ſeldom or ever relied upon for the cure of dropſies, and only uſed in aid of more powerful remedies, it is juſtly obſerved by Duncan (New Ed. Diſp.) that "perhaps one of the beſt forms under which the berries can be uſed is that of a ſimple infuſion. This by itſelf, or with the addition of a little gin, is a very uſeful drink for hydropic patients." Medical writers have alſo ſpoken of the utility of juniper in nephritic caſes, uterine obſtructions, ſcorbutic affections, and ſome cutaneous diſeaſes; and in the two laſt-mentioned complaints, the wood and tops of the plant are ſaid to have been employed with greater advantage than the berries. Our Pharmacopeias direct the eſſential oil and a ſpirituous diſtillation of the juniper berries to be kept in the ſhops: the former, in doſes of two or three drops, is found to be an active and ſtimulating medicine; the latter contains this oil, and that of ſome other aromatic ſeeds united to the ſpirit, and therefore differs not conſiderably from the genuine geneva imported from Holland: but there is great reaſon to believe, that the gin uſually ſold here is frequently nothing but the frumentaceous ſpirit, imbued with turpentine, or other materials to give it a flavour. Woodv. Med. Bot.

Etmuller had a high opinion of juniper berries. The rob made of the expreſſed juice of the green berries has been called by many, the *theriaca Germanorum;* ſo much are they eſteemed by that nation for their alexipharmic qualities.

The wood of juniper, it is ſaid, will laſt a hundred years without corrupting; the chemiſts add, that a coal of juniper, covered with aſhes of the ſame kind, will keep on fire an entire year.

From this juniper, the gum ſandaracha is obtained: it exudes through the crevices of the bark, or the perforations made by inſects.

The bark of the *Juniperus Lycia* yields the officinal gummy reſinous ſubſtance, called Olibanum. See FRANKINCENSE and OLIBANUM.

The *Juniperus Sabina*, or common ſavin, is a native of the ſouth of Europe and the Levant: it has been long cultivated in our gardens; and from producing male and female flowers on ſeparate plants, it was formerly diſtinguiſhed into the barren and berry-bearing ſavin. The leaves and tops of ſavin have a moderately ſtrong ſmell, ſomewhat diſagreeable, and a hot, bitteriſh, acrid taſte: they give out part of their active matter to watery liquors, and the whole to rectified ſpirit. Diſtilled with water, they yield a large quantity of eſſential oil. From thirty-two ounces Hoffman obtained five ounces of this oil, in which the whole virtue of the plant ſeems to reſide. Decoctions of the leaves, inſpiſſated to the conſiſtence of an extract, retain a conſiderable ſhare of their pungency and warmth along with their bitterneſs, and have ſome degree of ſmell, not reſembling that of the plant itſelf. On inſpiſſation of the ſpirituous tincture, there remains an extract, conſiſting of two diſtinct ſubſtances, of which one is yellow, unctuous or oily, bitteriſh, and very pungent; the other black, reſinous, tenacious, leſs pungent, and ſubaſtringent. Lewis' Mat. Med.

Savin is a powerful and active medicine, and has been long reputed the moſt efficacious in the Materia Medica, for producing a determination to the uterus, and thereby proving emmenagogue: it heats and ſtimulates the whole ſyſtem very conſiderably, and is ſaid to promote the fluid ſecretions. Its force in overcoming interior obſtructions is ſo great, that it is ſaid to have been employed, and too ſucceſsfully, for purpoſes the moſt infamous and unnatural. It has, however, ſometimes failed as an emmenagogue, which has, in ſome meaſure, been aſcribed to the ſmallneſs of the doſe given by phyſicians. Dr. Hume (ſee Clinical Exper.) ſeems to have had very great ſucceſs with this medicine; for in five caſes of amenorrhœa, which occurred at the Royal Infirmary at Edinburgh, four were cured by the ſabina, adminiſtered in powder from a ſcruple to a dram twice a day. He ſays it is well ſuited to the debile, but improper in plethoric habits; and he therefore orders repeated bleedings before its exhibition. Externally ſavin is recommended as an eſcharotic to foul ulcers, ſyphilitic warts, &c. Woodv. Med. Bot.

JUNISEN, in *Geography*, a town of Sweden, in the lapmark of Kemi; 64 miles N.N.E. of Kemi.

JUNIVILLE, a town of France, in the department of the Ardennes, and chief place of a canton, in the diſtrict of Rethel. The place contains 984, and the canton 5775 inhabitants, on a territory of 215 kiliometres, in 13 communes.

JUNIUS, FRANCIS, in *Biography*, a learned French Proteſtant divine, deſcended from a noble family, was born at Bourges in the year 1545. At the age of thirteen, he had made an extraordinary proficiency in learning; and being intended for public life, he began the ſtudy of the civil law, and after proſecuting it for ſome years, he was ſent to Lyons, to join the train of the ambaſſador from the king of France to Conſtantinople. He unfortunately arrived too late, and accordingly remained in that city to attend the public lectures of the college. Here, by his avidity in purſuing knowledge, he recommended himſelf to the principal, which was of great ſervice to him in his ſtudies. In this city he became acquainted with a perſon deeply tinctured with ſceptical notions, and became himſelf an atheiſt. On his return to Bourges, his father engaged him in a courſe of reading, particularly of the New Teſtament, which inſenſibly reclaimed him from thoſe principles which he had imbibed at Lyons; and from this period he attached himſelf to ſtudies connected with ſacred literature and piety. In 1565 he was appointed miniſter of the Walloon church at Antwerp, where his labours were eminently uſeful in ſpreading the reformed religion, on account of which his father had been murdered a ſhort time before by the bigotted Catholics. Junius ſoon became obnoxious to the Inquiſition, which had been lately introduced into the Low Countries; and many attempts were made by the emiſſaries of that tribunal to get poſſeſſion of his perſon, which timely information enabled him to elude. In 1568 he was made chaplain to the prince of Orange, whom he accompanied during the unfortunate expedition to the Netherlands; and upon his return, he reſumed his miniſterial functions at Schoon, to which he had been before appointed by the elector palatine Frederic III. He was, after this, noticed by Henry IV. of France, and employed upon ſome public miſſions; which being accompliſhed, he accepted the divinity profeſſorſhip at Leyden, the duties of which he performed with ability and great reputation for the ſpace of ten years. He died of the plague in 1602, in the 57th year of his age. He was author of numerous works, theological, controverſial, and philological, of which the following may be mentioned: "Commentaries," on the firſt three chapters of Geneſis, the prophecies of Ezekiel, Daniel, and Jonah; "Sacred Parallels," and "Notes," upon the book of Revelation; "A Tranſlation out of Hebrew into Latin of the whole Old Teſtament;" "Hebrew Lexicon;" "Grammar of the Hebrew Tongue;" "Notes on Cicero's Epiſtles to Atticus."

JUNIUS, FRANCIS, ſon of the former, was born at Heidelberg in 1589, and was educated at Leyden. He was firſt intended for the military profeſſion, but circumſtances induced him to change his purpoſe, and he devoted himſelf entirely to letters. As a literary man, his firſt occupation was in collecting and publiſhing ſome of his father's works. In 1620 he came to England, and reſided in the family of Thomas earl of Arundel, as librarian, during the ſpace of thirty years. Being, it is ſaid, void of all ambition, and indifferent to the uſual objects of worldly purſuit, he made ſtudy the whole buſineſs of his life. His frequent viſits to the Bodleian and other libraries led him to obtain an intimate knowledge of books written in the Anglo-Saxon dialect. Convinced that in this he could diſcover the etymologies of all the tongues of northern Europe, he applied to it, and to the other dialects connected with it, with the greateſt aſſiduity. His final concluſion was, that the Gothic was the mother of all the languages of the Teutonic ſtem. In hopes of hearing the ancient Saxon ſpoken in its ancient purity, he went and reſided in Frieſland for two years. On his return through Holland, he met with the MS. of the four evangeliſts in ſilver Gothic letters, known by the name of the ſilver MS. This he ſet about explaining, and publiſhed it with a gloſſary, ſubjoining a verſion of the ſame in the Anglo-Saxon, with notes by Dr. Marſhall. He returned to England in 1674, and died at Windſor in 1677, at the age of eighty-eight. He bequeathed all his MSS. and collections to the public library at Oxford. His works are "De Pictura Veterum;" "Obſervationes in Willeromi Francicam Paraphras in Cantici Canticorum." But his great labour was a "Gloſſarium Gothicum," in five languages, compriſed in nine volumes. An "Etymologicum Anglicanum" was publiſhed from his papers, by the Rev. Edward Lye, in 1743. Bayle. Wood Ath. Ox.

JUNIUS, in *Geography*, a military townſhip of America, in Onondaga county, New York, at the N. end of Cayuga lake.

JUNIUS *Creek*, a northern branch of the Little Kanhaway, which interlocks with the weſtern waters of Monongahela river. See KANHAWAY.

JUNK, a river of Guinea, which runs into the Atlantic, N. lat. 6° 5′. W. long. 10° 5′.

JUNK, in *Sea Language*, a name given to any remnants or pieces of old cable, which is uſually cut into ſmall portions, for the purpoſe of making points, matts, caſkets, ſennit, &c.

JUNKS, large flat-bottomed veſſels, from 100 to 500 tons burden, uſed by the Chineſe. They have three maſts, and a ſhort bowſprit placed on the ſtarboard bow. The maſts are ſupported by two or three ſhrouds, which at times are all carried on the windward ſide. On the fore and main maſt is hoiſted a ſort of lug-ſail, made of cane or bamboo. Theſe ſails are confined by iron travellers, that encircle the maſt, and fixed to bamboos at ſeveral diviſions on the ſail. The ſail is kept to the wind by two ropes, faſtened to wood ſtirrups, fixed to the foot of the ſail, and lead to the maſt-head. The lee part of the ſail is hauled aft, by a rope that branches into ſhort legs, that are made faſt to each fold of the ſail. On the mizen-maſt is a gaff-ſail, made of coarſe cotton; a top-ſail made of the ſame is carried on the main-maſt; alſo a jib and ſprit-ſail, that are ſet on the bowſprit. Similar to theſe junks are the Japaneſe barks, which are 80 or 90 feet long on one deck, but have only one maſt, that carries a ſquare ſail, and forward one or two jibs made of cotton. They only uſe ſails when the wind is large.

JUNKER, CHRISTIAN, in *Biography*, was born at Dreſden in 1688. He ſtudied at Leipſic, was made firſt rector and librarian at Eiſenach, and hiſtoriographer to the prince of Saxony. In 1711 he was elected a member of the Royal Academy of Sciences at Berlin, and in 1713, director of the gymnaſium at Altenburg. He died in the following year through grief from the loſs of his wife, whoſe death preceded his own but five days. Of his literary talents he gave ſufficient proof by the many works which he publiſhed, and particularly by his "Geography of the

Middle Ages," in quarto. This work, which was publiſhed at Jena in 1712, is divided into two parts, and the whole concluded with a very uſeful index of all the countries, towns, villages, foreſts, rivers, and mountains known in the middle ages. His other principal works are, "Vita D. Mart. Lutheri et ſucceſſum Evangelicæ Reformationis," &c.; "Vita Jobi Ludolphi, accedunt Epiſt. aliquot clariſſ. virorum, nec non Specimen Linguæ Hottentotticæ;" "Principles of the Eccleſiaſtical Hiſtory of the Old and New Teſtament:" and "Lineæ primæ Eruditionis univerſæ Hiſtoriæ Philoſophicæ." Gen. Biog.

JUNKOWADA, in *Geography*, a town of Africa, in the kingdom of Yani; 22 miles W. of Piſania.

JUNKSEILON, or JUNK CEYLON, an iſland in the Eaſt Indian ſea, on the E. ſide of the bay of Bengal, belonging to Siam, and governed by a viceroy from that court. It derives its name, according to captain Forreſt, from a corruption of "Oojong Sylan," ſignifying, in the Malay language, point or promontory of Sylan, the S. point projecting a little way into the ſea. It ſtretches nearly N. and S. about 50 or 60 miles long, and is about 15 miles broad; its centre is ſituated in 8° N. lat. ſeparated from the continent of Malacca by an iſthmus of ſand, about a mile long and half a mile broad; which iſthmus is covered only at high water, and ſhuts up in the N. part an excellent harbour, called "Popra," with good anchorage round it, generally on a muddy bottom. The hills of this iſland are of moderate height; and inſtead of rivers, it has creeks, running into the ſea, through flat marſhes of mangrove trees from pleaſant brooks in the interior parts. The veſſels uſed by the inhabitants conſiſt of a few prows, about the ſize of Indiamen's long boats, and ſmall canoes, in which they ſail up the creeks to the cultivated plains in the middle of the iſland, abounding with rice fields. Beſides Popra, there is another capacious harbour on the S. W. part of the iſland. The place where ſhips generally anchor is in a good road, well ſheltered behind a ſmall iſland, joined at low water to the main land. In this iſland are 17 towns or villages, and the number of inhabitants is eſtimated at about 12,000. They have many elephants procured from Mergui, but no horſes; they have bullocks and buffaloes for labour,; wild hogs and deer; a few tame goats; no ſheep; domeſtic dogs and cats. They have ſome of the common poultry. The climate is agreeable, without extreme heat; the rain comes on gently in July, and continues, but not without frequent intermiſſions, till November, when fine weather ſucceeds, with very cool N.E. winds at night, favourable to the cultivation of vegetables. The opium, formerly ſold on this iſland in great abundance, was brought in Engliſh ſhips from Bengal, and purchaſed by thoſe who uſed Malay and Buggeſs prows: they ſold it by retail to the natives for tin, and exchanged it with the Bengal veſſels for opium, which they carried chiefly to Celebes and other Malay iſlands. The mixed cargo of the Malays was generally a chequered cloth, called Buggeſs cambays, made on the iſland of Celebes, painted cloths and painted handkerchiefs of Java, generally made from Hindooſtan long cloth, Java gongs, braſs pots, and other utenſils of braſs made in that iſland; China and Java tobacco; various porcelain; blue and white unbleached cloth called "kangan," and white and blue called "compow," brought from China by the junks that reſort to Siam, Macaſſar, Sooloo, Batavia, and other places. But the courſe of trade is much altered of late: opium being forbidden to the natives, the importation of it is prohibited, and a heavy duty is laid on the exportation of tin by orders from Siam; ſo that the trade has much declined. Hindooſtan piece goods, and ſome European articles, ſuch as iron, ſteel, lead, cutlery, and broad cloth, being almoſt the only imports. The trade of this iſland is conſiderable in ivory and tin. The exportation of tin is annually eſtimated at 500 tons. N. lat. 8°. E. long. 98° 20′.

The Birmans, wiſhing to obtain the entire dominion of the weſtern coaſt, as far as the territories of the Malay prince of Queedah, made an attempt, in 1785, to get poſſeſſion of this iſland. By ſo doing, they would have been able to monopolize the commerce of the peninſula, and prevent the Siameſe from communication with India by any other channel except the gulf of Siam. Beſides, the iſland was deſirable on account of its mild climate and luxuriant ſoil. Having fitted out a powerful armament of 11 ſhips and 8000 men, they attacked the fort, which is ſituated on the E. ſide of the iſland, and ſucceeded, notwithſtanding a ſpirited reſiſtance on the part of the Siameſe governor, who afterwards withdrew from the fort into the interior of the iſland. The triumph of the Birmans was of ſhort duration: the Siameſe governor rallied his forces, and drove the Birmans to their ſhipping with great loſs. Apprehenſive of greater diſaſters they returned to Mergui, whence the fleet ſailed for Rangoon, and the troops marched to Martaban. In the year 1786, the Birmans renewed their attack, and blocked up the harbour of Junkſeylon; but in the event they were completely routed by a powerful army of the king of Siam. Symes's Embaſſy to Ava, vol. i. See SIAM.

JUNO, in the *Heathen Mythology*, a goddeſs; the daughter of Saturn and Rhea, the ſiſter and wife of Jupiter: ſhe is otherwiſe called Lucina. According to Heſiod, ſhe was the mother of Hebe, Venus, Lucina, and Vulcan.

Juno, as well as Jupiter, had a great variety of characters among the ancients, but the favourite one of them all, among the Romans, was that of the Juno Matrona, dreſſed like the Roman matrons in a long robe which covered her from head to foot. The figures of the Roman empreſſes were often formed under this character of Juno. Such is the ſtatue of Sabina, at the Villa Mattei in Rome. This Juno was called indifferently, Juno Matrona and Juno Romana. The Juno Regina, and Juno Moneta, are always repreſented on the ancient gems and medals, in a very fine and magnificent dreſs, with the inſtruments of coinage, and under the latter appellation ſhe had a temple at Rome. We may obſerve, that Virgil, Æn. i. v. 17. and Æn. ii. v. 614, ſpeaks of Juno, not according to the appearance ſhe uſed to make among the Romans, but according to the repreſentations of her in other countries. In one place, where he deſcribes her arms and military chariot, he ſpeaks of the Carthaginian Juno; and in the other he has given her an angry and warlike figure, which belongs to the Juno Argiva, or ſome particular Juno of the Greeks. However, the Juno Soſpita, among the Romans, appears on ſeveral medals in a war chariot, and with a ſpear in her hand. She was called Soſpita, becauſe ſhe watched over the ſalubrity of the air, the intemperature of which is the cauſe of diſeaſes. Under this name ſhe had three temples, one at Lanuvium, and two at Rome: and Cicero informs us, that the conſuls, before they entered upon their office, were obliged to offer a ſacrifice to her. Another name of Juno was the "Queen," or "Regina," under which appellation ſhe had a ſtatue at Veii, that was tranſported to the Aventine mount, under the dictatorſhip of Camillus, where it was conſecrated by the ladies of the city. This ſtatue was held in ſuch reverence, that none but her prieſt could touch it. There was alſo a mild Juno, as well as a mild Jupiter, among the Romans: under which character, her face appeared more gentle and good-humoured than uſual: but the moſt obvious and ſtriking character of

Juno, which we derive from the writings of Homer and Virgil, is that of an imperious and haughty wife. Theſe poets oftener repreſent her ſcolding at Jupiter, than careſſing him. Nevertheleſs, ſhe was anciently conſidered as the great patroneſs of marriage and a wedded life. Under this character ſhe had the name of *Juga* and *Pronuba*, (Virgil, Æn. 4.) and had an altar in the ſtreet called Jugara. When ſhe preſided over women in childbed, and was confounded with Diana, ſhe obtained the name of Lucina, and was repreſented as a matron, holding a cup in her right hand, and a ſpear in her left, with this inſcription, "Junoni Lucinæ." Sometimes ſhe was repreſented ſitting on a chair, holding in her left hand a child in ſwaddling clothes, and in the right a flower reſembling a lily; and alſo a whip and a ſceptre, the whip ſignifying a happy delivery. Juno, under the character of preſiding over the air, is repreſented in a light car, drawn by peacocks, and attended by the Auræ, or nymphs of the air.

Of all the divinities of the Pagan world, there was not one whoſe worſhip was more ſolemn and more general than that of Juno. It was not confined to Europe alone, but found its way into Aſia, eſpecially into Syria; and alſo into Egypt, and other parts of Africa. Greece and Italy abounded with temples, chapels, or altars dedicated to this goddeſs, and in ſome places of diſtinction ſhe had ſeveral of theſe. Among the more celebrated towns, there were three that paid a more particular worſhip to Juno than others, *viz.* Argos, Samos, and Carthage. The prieſteſſes of Juno of Argos were highly reſpected in Greece; and their prieſthood ſerved to diſtinguiſh the principal eras of the Grecian hiſtory. Among the birds, the hawk was appropriated to her, and above all the peacock, which laſt was frequently an appendage to her ſtatues. According to Ælian (De Animal.), the Egyptians conſecrated to her the vulture. Dittany and the poppy were the plants which the Greeks offered to her, when they took her for Juno Lucina. Among the animals, the ewe-lamb was peculiarly conſecrated to her, and was the moſt common victim offered to her in ſacrifice. It was uſual, however, to offer to her a ſow on the firſt day of each month. We may infer the high veneration which was paid to Juno, eſpecially by the women, from this circumſtance, that their guardian deities were called "Junones," as thoſe of the men were denominated "Genii." Apuleius ſums up the honours that were paid to Juno in a comprehenſive manner, by informing us that ſhe was worſhipped as the "Queen of the Goddeſſes." See Jupiter, *infra*.

Juno the Aſſyrian was called *Aſtarte*, which ſee.

Juno, in *Aſtronomy*, the name given to one of the new planets by M. Harding the aſtronomer, who diſcovered it at Lilienthal, in Germany, the 1ſt September 1804. Two of theſe ſingular bodies, Ceres and Pallas, had before been diſcovered by Piazzi and others, and the great difficulty with which they are formed after they have been enveloped in the ſun's rays, ſuggeſted the taſk to Mr. Harding, of conſtructing a ſpecies of zodiac, to enable aſtronomers to find theſe two ſmall planets. In this zodiac he placed not only all the ſtars in the catalogues, but alſo all the ſmall ſtars which he himſelf could obſerve and place in the probable tract of the planets. It was in executing this laborious undertaking, that he perceived a ſmall ſtar which he thought had not been in the ſame place a ſhort time before. Three days afterwards it had evidently changed its place, and advanced towards the eaſt two degrees. A ſeries of obſervations ſoon convinced him that he had diſcovered a third planet of the ſame claſs as Ceres and Pallas.

Its orbit has been calculated by Mr. Gauſs and Mr. Burckhardt, as follows:

Seeberg, 1ſt Jan. 1805.

	Mr. Gauſs.				Mr. Burckhardt.			
Longitude	1^s	12°	$32'$	$36''$	1^s	12°	$17'$	$31''$
Aphelion	7	23	11	39	7	22	49	0
Node	5	21	4	16	5	21	6	0
Inclination		13	3	38		13	5	0
Diurnal motion				$815''.9595$				
Annual motion	2	22	43	45.2				
Excentricity			0	254236			0	.25096
Semi-axis Maj.			2	66445			2	657

The mean diameter of this planet, as ſeen from the earth, is, according to Schroeter, $3''.057$, but he differs in his opinion on this ſubject from Dr. Herſchel, who eſtimates it much ſmaller, and aſtronomers are at preſent unable to decide to which theory they ſhould incline.

Under the article Planets we ſhall again reſume the ſubject of theſe newly diſcovered bodies, and attempt to ſhew the ſtrong arguments that may be urged to prove that they are all fragments of a large planet which once circulated between Mars and Jupiter.

JUNOH, in *Geography*, a town of Hindooſtan, in Bahar; 35 miles N.E. of Nagpour.

JUNONES. See Genius.

JUNONIA, the name given at Rome to a feſtival inſtituted by the Greeks in honour of Juno, and by them called *Heræa;* which ſee.

JUNQUERA, La, in *Geography*, a ſmall town of Spain, in the province of Catalonia, ſituated at the entrance of a plain, which, as Strabo ſays, was fertile in flax and ſpart, or ſea-ruſh, whence it acquired the name of "Campus Juncarius," and the town that of "Juncaria." This town was eſtabliſhed by a colony of Maſſilians, and was formerly conſiderable; but is now much reduced. It has a pariſh church, but little trade. The environs abound with cork trees; 30 miles N. of Gerona.

JUNTA, called alſo *Junto*, and *Juncto*, a council, or company, of ſeveral perſons, meeting for the diſpatch of any buſineſs.

The term is particularly uſed in the Spaniſh and Portugueſe affairs. On the death of Charles II. king of Spain, the kingdom was governed, during the abſence of Philip V. by a junta.

In Portugal they have three conſiderable juntas: the junta of *commerce*, that of the *three eſtates*, and that of *tobacco.* The firſt was eſtabliſhed by king John IV.; this is a council of marine. The ſame king alſo aſſembled the ſtates of his kingdom, to create the tribunal of the junta of the three eſtates. King Peter II. created the junta of tobacco in 1675: it conſiſts of a preſident and ſix counſellors.

IVOIRE, in *Geography*, a town of France, in the department of the Leman; 13 miles N.N.E. of Geneva.

IVORY, (*Ebur,*) the tuſks or large conical teeth in the upper jaw of the elephant. This name is alſo ſometimes improperly given to the teeth of the ſea-unicorn (Monodon monoceros), the morſe (Trichecus roſmarus,) and thoſe of the Hippopotamus (ſee theſe articles).

The elephants' tuſks from Africa are in general preferred by the dealers in this article; they generally run conſiderably larger, but it is a common opinion, that the ivory from Ceylon is leſs liable to turn yellow when expoſed to the action of the atmoſphere, whence it is ſold at a higher price than the other. By far the greateſt part of this merchandize is brought from Africa; and a part of Guinea, which has furniſhed the greateſt quantity of it, has obtained the name of the Ivory Coaſt: the tract of coaſt from Cape Palmas, to Apollonia or Treſpunta, is more particularly known by this appellation. But the principal market for ſome time paſt appears to have been at the eaſt coaſt of Africa, where the ivory is ſuppoſed to be found of ſuperior quality; indeed the Engliſh merchants at Surat pay a greater price for the tuſks furniſhed by this part of the coaſt than for ſuch as are brought from any other part of Africa.

The beſt tuſks are theſe that are leaſt curved, without ſpots, and moſt ſolid towards the baſe. Some writers on this ſubject pretend that ſuch elephants as inhabit ſwampy places, generally produce blue, ſpongy, and knotty tuſks, in every reſpect inferior to thoſe of elephants living in hilly countries or on dry plains. The Ethiopian elephants' tuſks, according to Paul Lucas, are furniſhed with larger cavities, and are therefore leſs eſteemed.

In commerce, unwrought ivory paſſes under the appellation of marfil, or morfil, a word which Friſch derives from the Spaniſh, but is probably of Mooriſh or Indian origin. Tuſks under a certain weight (ſome ſay 14, others 20 pounds) are called *Crevelles* by the African merchants; a word which appears to be the ſame with *Eſcarballe*, or *Eſcarbeille* of the French, and *Scaravelios* of the Spaniards and Portugueſe.

Elephants' teeth conſtitute a very important article of commerce. Labat computed the quantity of ivory annually imported into France at his time, by the Senegal company, to be 500 quintals, or 50,000 pounds. In 1784 the number of tuſks imported into Nantes was 744, beſides 360 pounds weight; and into Havre de Grace, in the ſame year, 435 tuſks and 1805 pounds, and into Bourdeaux 5999 pounds. In the following year 3007 pounds and 471 tuſks were imported into Nantes; in 1787, 16,184 pounds and 395 teeth; and into Havre de Grace 3784 pounds.

In an account which the houſe of commons ordered to be given in, of the quantities of the principal articles in the nature of raw materials, imported and uſed in the manufactures of Great Britain for twelve years preceding the year 1799, we find the following reſpecting the importation of elephants' teeth; *viz.*

1788	1,387 cwt.
1789	2,145
1790	1,476
1791	3,735
1792	1,484
1793	1,412
1794	2,203
1795	1,047
1796	1,167
1797	1,969
1798	889

and in an account, likewiſe delivered to the houſe of commons, of the quantity of the ſame articles, on an annual medium of four periods of five years, each commencing the 5th of January 1772, the following related to the article under conſideration; *viz.* Five years preceding

5th January	1776	690 cwt.
	1787	1,339
	1792	2,050
	1799	1,291

The component parts of ivory being the ſame as thoſe of bones (*viz.* phoſphate of lime combined with a gelatinous ſubſtance), and differing only with regard to texture, hardneſs, and whiteneſs, the preparations it undergoes in the arts are equally applicable to the bones of animals. The whiteneſs which ivory acquires depends chiefly on the degree of dryneſs it has acquired. When yellow, its gelatinous matter is altered by the air, and appears to be combined with the oxygen of the atmoſphere. Oxygenated muriatic acid will reſtore it to its original whiteneſs. Thoſe employed in working ivory, diſtinguiſh the *white* and the *green*. The former is known by the whitiſh or lemon coloured rind of the tuſks, the other by the brown and blackiſh. The green ivory (ſo called from a greeniſh or faint olive colour pervading its ſubſtance) is preferred, it being of a cloſer texture, and known ſoon to exchange its green hue for the moſt beautiful white, which is leſs liable to turn yellow. This green ivory is, however, more brittle than the other.

Heat cannot be made uſe of for making ivory pliant, though it is rendered ſofter by being expoſed to that agent. It is divided by the ſaw; ſometimes (for delicate work) under water, in order to prevent its being heated or rent in the operation. It is poliſhed with pumice and tripoli. Ivory has been ſaid to become ſoft by being placed in muſtard; but that end is attained with greater certainty by ſteeping it in ſome diluted mineral acid. Both ivory and common bones become alſo ſoft by being immerſed in an alkaline lye made of ſoda and quick lime.

By burning this ſubſtance in cloſed veſſels, and afterwards levigating it with water on a porphyry ſlab, we procure what is called *black ivory*, much uſed for painting and other purpoſes that require a very intenſe velvet-like black colour.

The following obſervations, relative to the nature of the tuſks of elephants, are extracted from Cuvier's excellent memoir "On living and foſſil Elephants," in the Annales du Muſeum, and tranſlated in the Philoſophical Magazine, vols. xxvii. xxviii. and xxix. to which, eſpecially as our article ELEPHANT was written previous to the publication of that elaborate memoir, we refer our readers for a more complete natural hiſtory of that remarkable animal.

Cuvier, in examining the varieties of tuſks, and the differences remarked in this reſpect among elephants, obſerves, that their texture exhibits no important difference. It always preſents, upon its tranſverſe ſection, thoſe ſtreaks which proceed like an arc of a circle from the centre to the circumference, and form, in growing, curvilinear lozenges which occupy the whole diſk, and which are more or leſs broad, and more or leſs perceptible to the eye. This character, common to all elephant ivory, and depending immediately on the pores of their pulpy nucleus, is not to be found in the tuſks of any other animal. It is to be ſeen in all foſſil tuſks, and it refutes the opinion of Leibnitz, adopted by ſome other writers, and even by Linnæus, that the mammoth horns might have belonged to the Trichecus roſmarus. The tuſks of theſe animals, however, ſeem wholly compoſed of ſmall round accumulated grains.

The ſize of tuſks varies according to the ſpecies, ſexes, and varieties; and as they are growing all their lives, age, more than any thing elſe, influences their dimenſions. The African elephant, as far as we are able to aſcertain, has very large tuſks in both ſexes. The African female, 17 years old, the ſkeleton of which is in the muſeum of Paris, has larger tuſks than any male or female Indian elephant of the ſame ſize that we are acquainted with. It is from Africa we receive the moſt ivory, and the greater number of tuſks; and they are alſo harder and whiter than any others. But our limited knowledge is confined to the elephants of the weſtern coaſts, and to thoſe of the ſouth of Africa. We are ignorant if thoſe of the eaſtern ſhores reſemble them in every thing, and if there be any varieties in the interior. We know from Pennant, however, that the coaſt of Moſambique furniſhes tuſks ten feet long; being the largeſt ever known. In the Indian ſpecies there are more varieties of tuſks, which Mr. Corſe has developed with more care than any other writer (ſee Phil. Tranſ. 1799, and art. ELEPHAS;) but all theſe varieties have nothing conſtant, and are mixed indiſcriminately with each other. In Bengal, the tuſks weigh little more than 72 pounds, and they do not exceed 50 in the province of Tipperah, which produces the beſt elephants. There are tuſks in London, however, probably from Pegu, which weigh 150 pounds. It is, in fact, from Pegu and Cochinchina that the largeſt elephants and tuſks of the Indian ſpecies come. The coaſt of Malabar furniſhes no tuſks, according to Pennant, more than four feet long.

Cuvier has drawn up the following table of the length, diameter, and weight of the largeſt tuſks taken from other authors, or actually inſpected by himſelf: the tuſks from Africa are not diſtinguiſhed here from thoſe of India.

Authors who have quoted the Facts.	Their Authorities and Details upon the Origin of the Tuſks.	Length following the Curvature.	Diameter at the thick End.	Weight.	
				lb.	*oz.*
Hartenfels Elephantographia, p. 47, 48.	Tuſk from Sumatra, according to Louis Vartoman, quoted by Jonſton - - - - - - -	—	—	168	0
	Tuſk mentioned by J. C. Scaliger, "de Reb. Ind." -	—	—	162	0
	Tuſk from the Cab. of Septal, quoted by Herzog -	—	—	160	0
	Tuſk mentioned by Vielhauers, "Traité des Drogues" - - - - - - - -	—	—	200	0
	Tuſk, by Louis Barth, "de Reb. Indic." - - -	—	—	325	0
	Tuſk at Baſle, brought from India, quoted by Munſter in his "Coſmographie" - - - - - -	9′	—	about 100	0
	Idem - - - - - - - - - -	—	—	114	0
	Another tuſk mentioned by J. C. Scaliger - - -	more than 5′	—	—	
	Idem by Al. Cadamoſto - - - - - - -	8′	—	—	
	The largeſt tuſk, according to Gyllius - - -	10′	—	—	
	A tuſk in the poſſeſſion of a merchant of Venice - -	14′	—	—	
	The tuſks taken from Firmus, by Aurelian, according to Flavius Vopiſcus - - - - - - -	10′ Rom.	—	—	
Camper Deſcr. Anat. d'un Eleph.	Common tuſks from Guinea - - - - - -	—	—	100 to 120	0
	A tuſk belonging to Mr. Wolfers, merchant in Amſterdam - - - - - - - - -	7′ 4″ of France	9⅓″	208	0
	Tuſk belonging to Mr. Ryſsnyder, merchant in Rotterdam, according to Klockner - - - - -	—	—	250	0
	Tuſk ſold at Amſterdam; ſame author - - -	—	—	350	0
	Tuſk in Camper's cabinet - - - - - -	6″	7″	105	0
Faujas Géologie, 243.	The largeſt tuſk in the Muſeum of Natural Hiſtory at Paris - - - - - - - - -	6′ 6″	5″ 4‴	72	8
Mém. d'Hiſt. Nat. de l'Ital. 11.	Tuſk in the Florence cabinet - - - - - -	—	7″ 6‴	—	
Pennant.	The large tuſks from Moſambique - - - -	10′ Eng. or 9′ 2″ of Fran.	—	—	
Buffon Hiſt. Nat. t. xi. 4to.	Several tuſks meaſured by Eden - - - - -	9′ Eng.	—	from 90 to 125	0
	Lopés - - - - -	—	—	200	0
	Drack - - - - -	—	—	200	0
	Tuſks from Lowango, according to the Voyage of the Indian Company - - - - - - - -	—	—	126	0
	Tuſks from the Cape, according to Kolben - -	—	—	from 60 to 120	0

As the tuſks, M. Cuvier adds, grow during the life of the animal, and the body does not, the ſize of an elephant cannot be concluded from its tuſks, even by eſtabliſhing the proportion between individuals of one ſame variety, and the ſame ſex: as, on the other hand, the tuſks rot or break at their points, according to the greater or leſs uſe the animal makes of them, and they are ſharpened, more or leſs abruptly, into a point, we cannot conclude their length from the diameter at their baſe. Finally, their weight cannot be concluded from their dimenſions (Meſſerſchmidt in the Phil. Tranſ.), becauſe their cavity at the baſe may be more or leſs filled. The degree of curvature of the tuſks of elephants varies almoſt as much as their ſize. In various cabinets there are ſeveral tuſks to be ſeen with curvatures more or leſs ſtrange, and in particular ſome are ſpiral. Camper ſaw ſeveral of them in the Britiſh Muſeum, and Grew repreſents one which is turned round ſeveral times; and Cuvier knows, from M. Fabroni, that there is one of that deſcription in the Florence cabinet alſo. They are frequently ſeen in the form of an Italic *S*, &c.

A green dye may be given to ivory, by ſteeping it in aquafortis, tinged with copper or verdigris, or in two parts of verdigris and one of ſal ammoniac, ground well together, with ſtrong white-wine vinegar poured on them: and by converting the aqua-fortis into aqua regia, by diſſolving a fourth part of its weight of ſal ammoniac in it, ivory may be ſtained of a fine purple colour.

Ivory, bone, horn, and other ſolid parts of animals, may be ſtained black, in the ſame manner as wood. Theſe ſubſtances may be ſtained yellow, by boiling them firſt in a ſolution of one pound of alum, in two quarts of water; and then, having prepared a tincture of the French berries, by boiling half a pound of the berries, pounded, in a gallon of water, putting them into this tincture, after it has boiled about an hour, and letting them remain there half an hour. Turmeric root may be uſed inſtead of the berries; but in this caſe the ivory, &c. muſt be dipt in alum water after it is taken out of the tincture. Ivory, &c. may be ſtained blue, by firſt ſtaining it green, and then dipping it in a ſolution of pearl aſhes made ſtrong, and boiling hot: or it may be otherwiſe boiled in the tincture of indigo, prepared by the dyers; and afterwards in a ſolution of tartar, made by diſſolving three ounces of white tartar, or cream of tartar, in a quart of water. For other proceſſes and colours, ſee DYEING *of Bone*, &c. *Colouring and Staining of* BONE, and TORTOISE *Shell.*

Ivory may be prepared as a ground for miniature painting, by cleanſing the ivory leaves or tables, and rubbing them over with the juice of garlic. This is ſaid to be more eſſential for taking off the greaſineſs, which prevents the colours from fixing on the ground, than ſoap or gall. Ivory has the ſame medical virtues with hartſhorn; its ſhavings too, like thoſe of hartſhorn, boil into a jelly with water, and have the ſame reſtorative quality. See HARTSHORN.

IVORY *Black.* See *Ivory* BLACK.

IVORY, *Foſſil,* in *Natural Hiſtory.* It is not uncommon in the moſt modern alluvial ſoils, like the vallies in the baſin of Paris, mentioned by Cuvier and Brogniart, and the ſoil in which the docks adjoining the Thames were excavated, to find the bones, teeth, and tuſks of elephants; and this foſſil ivory is not, in ſome inſtances, much altered, though in general it has loſt its conſiſtence in a great meaſure, and readily ſcales off in concentric rings, and in others is impregnated with metallic ſubſtances, ſo as to imitate, if not form the Turquoiſe ſtones, the Callais of Pliny, &c. as Dr. Woodward has ſhewn in his Letters on the Method of Foſſils, p. 15. It may, however, be doubted, we believe, whether foſſil ivory has ever been found imbedded in the ſtrata, or the parts of any dry-land animals, numerous as their remains are in the laſt alluvial covering of ſome diſtricts The abundance of elephants' teeth found buried in different parts of the world, and many of thoſe parts ſuch as no elephant is ever known to have lived in, have given amazement to naturaliſts.

The long tuſks, which are what we call ivory, are the only teeth the vulgar are acquainted in this creature; yet even theſe, in their foſſil ſtate, have often been miſtaken for horns, or other animal parts. The grinders of this animal are ſo enormouſly large, and of ſo ſingular a ſhape, that it requires ſome knowledge in natural hiſtory to diſcover them at ſight, and many have miſtaken them, when imperfect, for parts of a petrified ſhell-fiſh of the nautilus kind, their root being hollowed all along, and armed with an indented ridge on each ſide, in the manner of the back parts of ſome ſhells of that and of the Cornu ammonis kind.

We are not to wonder that the teeth of elephants are found more frequently than any other bones of the animal, ſince their uſe in the creature required that they ſhould be harder than any other bone, and that hardneſs has preſerved them in places where the other bones have periſhed. The different ſtate in which theſe teeth are found, is wholly owing to the different juices abounding in the earth in the place where they were depoſited, ſome of thoſe juices being of power to preſerve, others to deſtroy them; ſome eating them inſenſibly away, ſome as it were calcining them by ſlow degrees, and others rendering them greatly more hard and durable than before. Mem. Acad. Par. 1727.

Count Marſigli, and ſome other writers, have thought it an eaſy ſolution of the queſtion of the teeth and bones of elephants being found in countries where elephants are not naturally found, that we owe them to the Romans, who, bringing them over for their uſe in war, buried them wherever they happened to die. But ſir Hans Sloane expreſſes himſelf very juſtly againſt this opinion: he obſerves, that of the remains of elephants found in Europe, nothing is ſo common as the ivory tuſks. Now, as he well obſerves, the Romans held ivory in the higheſt eſteem, and it ſold among them at a great price; wherefore, had they been the buriers of the elephants, they would certainly have taken away the ivory tuſks firſt. It is certain, therefore, that accident, and not deſign, hath buried theſe bones, and that accident can have been no other than ſome prodigious inundation. Woodward is deſirous of making the univerſal deluge to have done all this, but that ſeems not neceſſary to be ſuppoſed in every caſe. Sir Hans Sloane gives an enumeration of the moſt curious of theſe pieces of foſſil ivory, which his own cabinet contained, and of ſome others of the moſt remarkable, mentioned by authors; from which we may form a very diſtinct idea, both of the nature of the bodies themſelves, and of the places where they are uſually met with. See Philoſ. Tranſ. N° 403. p. 458.

The power of ſubterranean calcinations to render things of this kind brittle, is remarked by the ſame author from Moreton's Hiſtory of Northamptonſhire, in the inſtance of a foſſil tuſk of an elephant, which was in the whole at leaſt ſix feet long, and had preſerved its natural whiteneſs, though rendered ſo brittle as to fall into ſeveral pieces in the digging. This was dug up near Little Bowden, in Northamptonſhire; and the ſtrata of the place where it lay were as follows: 1. Vegetable mould, 14 inches. 2. Loam, a foot and a half. 3. Large pebbles, with a ſmall mixture of earth among them, two feet and a half. 4. Blue clay; in the upper part of this laſt ſtratum the tooth was found.

Sir Hans mentions another elephant's tuſk very entire and ſound, found in Siberia. The like are common in Siberia and many parts of Ruſſia, and are ſo little injured, that they are uſed as ivory, and are ſuppoſed to be the teeth of a vaſt animal called the *mammoth*, which they think lives under ground. Phil. Tranſ. N° 468. See farther on this ſubject, BONES, *Foſſil*, ELEPHANTS' *Bones*, and TEETH, *Foſſil.*

IVORY *Coaſt*, in *Geography*, a name given to a country of Africa, ſituated on the coaſt of the Atlantic, between Cape Apollonia to the E. and Cape Palmas to the W. The principal towns and villages are Groua, or Grua, Great Tabo, Little Tabo, Grand Drewin, Batrou, Laho, Apolonia, and Valfo. Theſe lie at the mouths of rivers, whence they derive their names. The interior of the country is little known, as the natives do not allow the Europeans to eſtabliſh ſettlements, or even to trade among them, except very cautiouſly, by means of the coaſt negroes. The chief commodities are gold, ivory, and ſlaves. The inhabitants are reckoned ſavage, and in a high degree jealous and ſuſpicious; inſomuch that in their traffick with the Europeans, they are artful and impoſing, and ſo eaſily incenſed and alarmed, that they will precipitate themſelves into the ſea from the European ſhips, and ſwim to their canoes.

The whole coaſt, if we except a few capes, from Cape Palmas to Cape Apollonia, is ſo low and ſtraight, that it furniſhes no diſtinct land-marks beſides the heights and mountains round Drewin. The landing is every where dangerous, on account of the ſwelling waves and high ſurfs; and the negroes, who are acquainted with this ſea, are the only people that can combat with the fury of its winds, tides, and waves, in their little canoes. From Cape Palmas to Cape Apollonia, theſe canoes are employed in loading and unloading our ſhips, that dread coming near the ſhore. Every country within the limits of the Ivory Coaſt is fruitful in rice, peaſe, beans, gooſeberries, citrons, oranges, and cocoa-nuts, beſides ſugar-canes. Upon the whole, the Ivory Coaſt is reckoned one of the fineſt diviſions of Guinea: the mountains and vallies, filled with villages, which are ſurrounded with lofty palms and cocoa-trees, preſent a delightful proſpect. The ſoil of the high land is a reddiſh earth, which, with the perpetual verdure of the trees, forms an agreeable mixture of colours. Cotton and indigo are the ſpontaneous growth of the provinces of Great Drewin and St. Andrew, which are the richeſt of the whole. Palm wine and oil are plentiful; together with a ſpecies of fruit, growing on a ſort of palm-tree, which the natives call tombo, or bourbon. This the negroes eat with great pleaſure, drinking at the ſame time a wine, drawn from the ſame tree, mixed with water. All ſorts of tame animals, ſheep, cows, goats, and hogs, are ſo numerous, that they are ſold almoſt for nothing. The coaſt affords great variety and abundance of fiſh. As to the people, they are rather above the common ſtature, clean-limbed and well proportioned; but their features on the firſt glance are hideous; yet when the firſt impreſſion is removed, Villault and Der Marchais concur in repreſenting them as the moſt rational, civilized, and poliſhed people in all Guinea. This account, however, is reſtricted to the natives of the Quaqua coaſt, that is, from the river Drewin to cape Apollonia; for as to the others, all authors deſcribe them as the moſt barbarous, cruel, and ſavage of all nations. Drunkenneſs is a crime of ſo odious a nature among the moſt civilized, that the laws have prohibited it under the ſevereſt penalties, and on pain of death. Their diet is coarſe and indelicate. Their teeth are ſharp, as they are in the conſtant habit of pointing them, and in general they are crooked and irregular. Long nails and a quantity of hair are deemed very ornamental. They are much addicted to the chewing of betel, with the juice of which they moiſten the neck and chin, under a notion, that it gives a fine varniſh and beautiful luſtre to the ſkin. Round the ſmall of the leg they wear large and heavy rings of iron, to which are appended bells, with the tingling ſound of which they are moſt delighted; and the multitude of theſe, as they imagine, conſtitute their dignity and grandeur. The common people only wear a piece of cloth round the waiſt, from a regard to decency; but perſons more opulent cover themſelves with a ſort of cloak or ſurplice, with long ſleeves, which they wrap round the ſhoulders, and hang down below the knee; and by their ſides they wear hangers or ſhort ſwords. Some of the women, who do not part with their hair to the men, adorn it with little plates of pure gold; and they are fond of coſtly trinkets. Their dreſs is a cloth, which falls over the fore-part of their bodies, the hinder parts being left naked; and indeed there are hardly any people on the whole coaſt of Guinea ſo primitive and ſimple in this particular, as the natives of the Ivory Coaſt, and particularly of Quaqua. Their form of ſalutation they have in common with all negroes; that of laying hold of the fingers, making them crack, and repeating the word "quaqua" ſeveral times in a low voice. It is a conſtant rule among them, that the ſon follows the profeſſion of the father, whatever it may be. In the mechanic arts they are ſingularly inexpert; a common door-lock is reckoned a great curioſity; a watch excites ſtill higher admiration; and making paper ſpeak, as they expreſs it, is a perfect miracle. Their religion, like that of the people on the Gold Coaſt, is wholly founded in ignorance and ſuperſtition. They entertain great reverence for their princes and prieſts; and they are fully perſuaded, that magic and ſorcery are powers inſeparable from majeſty and prieſthood. The natives of Quaqua cultivate ſeveral branches of trade with aſſiduity; and crowd on board any ſhips that approach their coaſt with all the produce of their country, gold, ivory, proviſion, and ſlaves. The European factors are much amuſed with obſerving canoes filled with men crowding round them, whilſt every mouth utters the ſame ſound, quaqua, quaqua, which ſeems to be a word by which they expreſs welcome. The negroes of Quaqua, however, are timorous and jealous in their intercourſe and traffic with Europeans. The uſual trade carried on in this part of the coaſt conſiſts of cotton cloths, ivory, gold, and ſlaves. The maritime negroes act as brokers to the inland negroes, ſell their ſtuffs for them, and receive ſo much *per cent.* by way of commiſſion. The Quaqua negroes manufacture a kind of plant, reſembling hemp, into a ſtrong cloth, to which they give beautiful colours, and pleaſing flowers and deſigns that indicate them to be no bad artiſts in their way. They have alſo a conſiderable trade in ſalt with their inland neighbours, to whom they ſell it at a very high price, on account of the diſtance and expence of carriage. All the countries behind Quaqua furniſh large ſtore of elephant's teeth, the moſt beautiful ivory in the world. This is conſtantly bought up as ſoon as it is brought to the coaſt by the Engliſh, Dutch, French, and ſometimes by the Danes and Portugueſe. Villault infers from the quantity of pure gold which the women wear for ornament, that the inland country has mines that furniſh virgin native gold. The European commodities which the negroes accept moſt readily in exchange for their own, are ſuch as are held in eſtimation in other parts of Guinea; with this difference, that here the bracelets and rings for the legs, either of copper or iron, muſt be of an intolerable weight.

Although the Ivory Coaſt be divided into a variety of petty ſtates or kingdoms, yet they have ſcarcely any ſeparate intereſts; for among themſelves war ſeldom happens, and of conſequence, the ſlave trade here has borne but a ſmall proportion to that traffic on the Gold and Slave Coaſts.

Authors have obſerved, that the exomphalus, hernia umbilicalis, or preternatural tumour of the abdomen at the navel from a rupture, is a diſorder extremely common on the Ivory Coaſt; though they are unable to account for its prevalence. Other deformities are as rare as this is common. Mod. An. Hiſt. vol. xiv.

JUPARITUBACA, a river of Brazil, which runs into the Atlantic, S. lat. 11° 10′.

JUPITER, a river of the iſland of Anticoſti, which runs into the river St. Lawrence, N. lat. 49° 25′. W. long. 63° 42′.

Jupiter, or Jove, in the *Heathen Mythology*, the ſovereign god of the heathens; the ſon of Saturn and Rhea; born in the iſland of Crete, at the ſame birth with Juno; he married Juno, expelled his father out of his kingdom, and divided the kingdom of the world with his brethren. Under ſeveral ſhapes he is ſaid to have played many wanton pranks; ſo that, according to poetic fiction, he filled heaven with his natural children.

The philoſophers, as we learn from Cicero's diſcourſes on the nature of the gods, took Jupiter only for the more purified air, or the ether, and Juno, his wife, for the groſſer air that ſurrounds our earth. Thoſe who regarded him as an animated god, or one of thoſe men, who, for their illuſtrious actions or uſeful inventions, were raiſed to divine honours, after having conſidered him as the ſovereign of gods and men, or as an almighty god, who, by the mere movement of one of his eye-brows, made Olympus tremble, degraded him afterwards by aſcribing to him the moſt unworthy actions and the moſt enormous crimes; he is, according to them, guilty of inceſt and adultery, an ungrateful ſon, a faithleſs huſband, choleric, paſſionate, and revengeful. Whence, we may naturally inquire, did the Greeks and Romans, renowned for their genius and philoſophy, derive ſuch ideas of their ſupreme divinity? They were the poets, it is ſaid, who gave ſuch a repreſentation of their Jupiter; but they muſt have borrowed it from the prevalent theology of the times. However, the hiſtory of this god is perplexed by the number and variety of perſons, to whom the name has been applied. We may obſerve, that the hiſtory of Jupiter, who was beſt known, is that of him, who had been king of Crete, and this hiſtory is filled up with the adventures of all the reſt. The ancients are not agreed with reſpect to the number of thoſe, to whom the appellation of Jupiter was applied. Diodorus Siculus reckons only two; one, who was the prince of the Atlantidæ, and the other, ſuppoſed to be his nephew, who became much more famous, and was king of Crete, the limits of whoſe empire extended to the extremities of Europe and Africa. Cicero admits three; two from Arcadia, one the ſon of Æther, and father of Proſerpine and Bacchus, and the other, the ſon of Cælus, and father of Minerva, who is ſaid to have invented war, and to have preſided over it; and a third, the ſon of Saturn, born in Crete, where, ſays Cicero, his tomb is ſtill to be ſeen. The moſt ancient of theſe, who bore the name of Jupiter, is ſaid to have been Jupiter Ammon of the Lybians. (See AMMON.) Jupiter Serapis, worſhipped alſo in Egypt, is very ancient. (See SERAPIS.) Jupiter Belus claims high antiquity; he is ſaid to have had a temple at Babylon, and was, according to Herodotus, the Jupiter of the Aſſyrians. (See BELUS.) Jupiter of Thebes has been ſuppoſed by ſome to have been Ammon, and by others Oſiris. (See OSIRIS.) The Scythians, the Ethiopians, and ſeveral other nations, had their reſpective Jupiter. Indeed, it is impoſſible to give a compleat liſt of all who bore that name, ſince, according to Varro and Euſebius, they amounted to 300. Beſides, all the gallantries that are aſcribed to Jupiter of Crete, and which, according to the poets, laſted 400 years, cannot belong to one and the ſame perſon. Jupiter of Crete, having baniſhed his father Saturn, and overthrown the Titans and Giants, determined to make his ſubjects happy. According to Heſiod, he was ſeven times married, and the laſt of his wives was Juno. His true name is ſaid to have been "Jou," ſignifying young, to which was afterwards added the appellation of "Pater," father, whence was derived Joupater and Jupiter. Others derive Jupiter from Juvan, or Juvans Pater. The Greeks call this god Zeus. The deſignation of father was intended to point out his ſuperiority over the other gods, which was alſo expreſſed by the epithets "Optimus Maximus." Jupiter, having become maſter of a vaſt empire, married his ſiſter, named by the Latins Juno, and by the Greeks Hera; and as he found it difficult to govern dominions of ſo wide an extent, he diſtributed them into different provinces. Accordingly we learn from Diodorus Siculus, that Atlas governed the frontiers of Africa. The ancients alſo inform us, that Pluto was appointed governor of the weſtern parts of the empire of the Titans, of the Gauls, and Spain; which government was afterwards transferred, upon Pluto's death, to Mercury, who, having ſignalized himſelf, became the great divinity of the Celtæ. Jupiter reſerved to himſelf the whole eaſt; that is, Greece, the Iſles, and that part of Aſia whence his anceſtors had ſprung. Thoſe of the ancients who wrote the hiſtory of Crete, extolled Jupiter for his prudence, valour, and juſtice, and for other civil and military virtues; and from theſe hiſtorians, whoſe works are now loſt, the Greek authors are ſaid to have taken the accounts they have given us of this prince. Oppreſſed with old age, after many adventures which ought to have been aſcribed to other princes who bore his name, he died in Crete, where his tomb was, for a long time, ſeen near Gnoſſus, one of the principal cities of the iſland, with this epitaph, "Here lies Zan who was called Jupiter." He lived to 120 years, having reigned 62 years from the defeat of the Titans and the death of Saturn. Banier reckons his reign to have begun 1842 years B.C., and to have terminated at his death 1780 years B.C. After his death his dominions were divided into ſeveral petty kingdoms; of which we have no account. The poets embelliſhed the ancient traditions, probably in part true, and in part falſe, with a great variety of fabulous circumſtances, which beſt ſuited the age and country in which they lived, and the purpoſes for which they wrote; and it would be endleſs to give a minute detail of the various fables which their luxuriant fancy created. Perhaps, in the better and more approved mythology, Jupiter might repreſent the ſupreme god, who governed at once heaven, earth, and hell. (See Pauſanias in Corinth. c. 24.) The various names by which this deified Jupiter, who was the great divinity of the Pagan world, and who was univerſally worſhipped from Egypt to the centre of Spain, was diſtinguiſhed, were derived from the places where he was worſhipped, or from ſome circumſtances that gave riſe to the temples, chapels and altars that were conſecrated to him; but it is needleſs to recount them. Many of them occur in the ſequel of this article, and make ſeparate heads in the Cyclopædia. Of all the gods of Paganiſm, whether they were derived from the elements of nature or from ſome eminent perſons, who were raiſed to this rank, the Jupiter ſeems to have been pre-eminent, and of courſe his worſhip was the moſt ſolemn, and attended with the greateſt variety of ceremonies. The moſt common victims offered to this god were the ſhe-goat, the ſheep, and the white bull, whoſe horns they took care to gild. In ſeveral caſes they had no victim, but made him an offering of flour, ſalt, and incenſe, eſpecially at Rome; at Athens, they ſacrificed an ox; and when he repreſented Jupiter the avenger, the ſacrifice of atonement preſented to him was a ſhe-goat. He had a temple at Rome, under that name, near the Capitol, where he was repreſented with arrows in his hand, to denote that he was ready to execute vengeance upon crimes. Among the trees, the oak and the olive were conſecrated to him. None worſhipped him more religiouſly, if we may believe Cicero, than the Roman ladies; "A Matronis Romanis caſtiſſima cultus" ſays that author. (De Nat. Deor. l. i.) Jupiter's three oracles, that of Dodona, that of Trophonius, and that which he had in Libya, were famous. See ORACLE.

As mankind are directed by an internal ſpirit or mind, the univerſe alſo is governed by an over-ruling intelligence; which, as the cauſe and preſerver of all animal beings, was called Ζεὺς ὁ Ζῶν. See GOD.

The heathens in general believed that there was but one ſupreme God; but when they conſidered this one great being as influencing the affairs of the world, they gave him as many different names; and hence proceeded their variety of nominal gods. When he thundered or lightened, they called him Jupiter; when he calmed the ſea, Neptune; when he guided their councils, Minerva; and when he gave them ſtrength in battle, Mars. In proceſs of time they uſed different repreſentations of this Jupiter, &c. and conſidered them, vulgarly at leaſt, as ſo many different perſons. They afterwards regarded each of them in different views: *e. g.* the Jupiter that ſhowered down bleſſings, was called the *Kind* Jupiter: and when puniſhing, the *Terrible* Jupiter. There was alſo one Jupiter for Europe, and another for Africa; and in Europe, there was one great Jupiter who was the particular friend of the Athenians, and another who was the ſpecial protector of the Romans: nay, there was ſcarcely a town or hamlet perhaps, in Italy, that had not a Jupiter of its own; and the Jupiter of Terracina or Jupiter *Anxur*, repreſented in medals as young and beardleſs, with rays round his head, more reſembled Apollo than the great Jupiter at the Capitol. In this way Jupiter at length had temples and different characters almoſt every where: at Carthage, he was called Ammon; in Egypt, Serapis; at Athens, the great Jupiter was the Olympian Jupiter; and at Rome, the greateſt Jupiter was the Capitoline Jupiter, who was the guardian and benefactor of the Romans, and whom they called the beſt and greateſt Jupiter, "Jupiter optimus maximus." The figure of this Jupiter was repreſented in his chief temple on the Capitoline hill, as ſitting on a curule chair, with the fulmen or thunder, or rather lightning, in one hand, and a ſceptre in the other. This fulmen in the figures of the old artiſts was always adapted to the character under which they were to repreſent Jupiter. If his appearance was to be mild and calm, they gave him the conic fulmen or bundle of flames wreathed cloſe together, held down in his hand. When puniſhing, he holds up the ſame figure, with two tranſverſe darts of lightning, ſometimes with wings added to each ſide of it, to denote its ſwiftneſs: this was called by the poets, the three-forked bolt of Jove: and when he was going to do ſome exemplary execution, they put in his hand a handful of flames, all let looſe in their utmoſt fury; and ſometimes filled both his hands with flames. The ſuperiority of Jupiter was principally manifeſted in that air of majeſty which the ancient artiſts endeavoured to expreſs in his countenance: particular attention was paid to the head of hair, the eye-brows, and the beard. There are ſeveral heads of the mild Jupiter on ancient ſeals, where his face has a mixture of dignity and eaſe in it, admirably deſcribed by Virgil, Æn. i. v. 256. The ſtatues of the Terrible Jupiter were generally of black marble, as thoſe of the former were of white: the one ſitting with an air of tranquillity; the other ſtanding, more or leſs diſturbed. The face of the one is pacific and ſerene; of the other angry or clouded. On the heads of the one the hair is regular and compoſed; in the other, it is ſo diſcompoſed, that it falls half-way down the forehead. The face of the Jupiter Tonans reſembles that of the Terrible Jupiter: he is repreſented on gems and medals as holding up the triple bolt in his right hand, and ſtanding in a chariot, which ſeems to be whirled on impetuouſly by four horſes. Thus he is alſo deſcribed by the poets. Ovid. Deian. Herc. v. 28. Horace, lib. i. od. 34. v. 8. Jupiter, as the intelligence, preſiding over a ſingle planet, is repreſented only in a chariot and pair: on all other occaſions, if repreſented in a chariot, he is always drawn by four horſes. Jupiter is well known as the chief ruler of the air, whoſe particular province was to direct the rains, the thunders, and the lightnings. As the diſpenſer of rain, he was called Jupiter Pluvius; under which character he is exhibited ſeated in the clouds, holding up his right hand, or extending his arms almoſt in a ſtraight line each way, and pouring a ſtream of hail and rain from his right hand on the earth; whilſt the fulmen is held down in his left. The wings that are given to him relate to his character of preſiding over the air: his hair and beard in the Antonine pillar are all ſpread down by the rain, which deſcends in a ſheet from him, and falls for the refreſhment of the Romans; whilſt their enemies are repreſented as ſtruck with the lightnings, and lying dead at their feet. Spence's Polymetis, p. 46. 182, and 210, &c.

JUPITER, in *Aſtronomy*, the largeſt of the planets of the ſolar ſyſtem; his diameter being 11 times greater than that of the earth, or 89,170 Engliſh miles. Its revolution on its axis is performed in 9 hours, 55 minutes, and 37 ſeconds. This planet moves from weſt to eaſt in a period of 11 years, 318 days, 14 hours, 27 minutes, 10.7 ſeconds. Its ſynodical revolution is about 399 days. Before its oppoſition with the ſun, and at about 115° from it, its motion becomes retrograde, and its velocity continually augments till the moment of oppoſition, after which it diminiſhes, and when at about 115° from the ſun, its motion changes from retrograde to direct. The duration of this retrograde motion is about 121 days, and the arc of retrogradation about 10 degrees: and it may be obſerved as a general rule with the ſuperior planets, that the farther they are from the ſun, the leſs is their arc of retrogradation; but the longer time is taken in deſcribing it, for were the diſtance of planets indefinitely great, the arc of retrogradation would be extremely ſmall, and its retrograde motion would laſt half a year, reſembling the effect of parallax of a fixed ſtar, if ever this ſhould be rendered ſenſible to our inſtruments.

Jupiter is, next to Venus, the moſt brilliant of the planets, and ſometimes even ſurpaſſes it in brightneſs. Its apparent diameter is greater at the oppoſitions, and is then equal to nearly 48″; its mean equatorial diameter is eſtimated at 38.8″. Its figure is an oblate ſpheroid, the proportion of its equatorial to its polar axis being about 14 to 13. La Place from theory deduces this proportion to be 1,000,000 to 9,286,922, a reſult obtained from computing the effect of the equatorial regions of the planet in diſturbing the nodes of the ſatellites. Almoſt every perſon is ſufficiently acquainted with the teleſcopic appearance of Jupiter, to know that its ſurface is remarkable for being always covered with a number of belts or ſtripes of various ſhades. Theſe appearances differ much at different times, and even at the ſame time in teleſcopes of different powers. Uſually theſe belts ſeem to be of an uniform tint; but in very favourable weather, they ſometimes appear to conſiſt of a number of curved lines, like the ſtrokes of an engraving. *Figs.* 143, 144, 145, 146. *Plate* XVI. *Aſtronomy*, repreſent four views of this planet, as given by Dr. Herſchel and Mr. Schroeter.

Theſe belts were firſt obſerved at Naples by Zuppi and Bartoli, two Jeſuits; and about the year 1660, they were obſerved by Campani, with refracting teleſcopes of his own conſtruction, and not much inferior in diſtinctneſs to thoſe of the preſent day; the great modern improvement in refracting teleſcopes, conſiſting rather in the reduction of their ſize than in the increaſe of their magnifying power.

Jupiter is accompanied by four ſatellites, which were diſcovered by Galileo, the 8th of January 1610. He at firſt took them for teleſcopic fixed ſtars; but continued obſervation ſoon convinced him that they really accompanied the planet. The relative ſituation of theſe ſmall bodies changes at every inſtant: they oſcillate on each ſide the planet; and it is by the extent of theſe oſcillations that the rank of theſe ſatellites is determined; that being called the firſt ſatellite, whoſe oſcillation is the leaſt. They are ſometimes ſeen to paſs over the diſc of the planet, and project a ſhadow in the form of a well-defined black ſpot, which then deſcribes a chord of this diſc.

Jupiter and his ſatellites, therefore, are opaque bodies, enlightened by the ſun; and when the latter interpoſe between the ſun and Jupiter, they produce real ſolar eclipſes, preciſely ſimilar to thoſe which the moon occaſions on the earth.

This phenomenon leads to the explanation of another which the ſatellites preſent. They are often obſerved to diſappear, though at ſome diſtance from the diſc of the planet: the third and fourth re-appear ſometimes on the ſame ſide of the diſc.

The ſhadow which Jupiter projects behind it, (relatively to the ſun,) is the only cauſe that can explain theſe diſappearances, which are perfectly ſimilar to eclipſes of the moon.

The circumſtances which accompany them leave no doubt of the reality of this cauſe. The ſatellites are always obſerved to diſappear on the ſide of the diſc oppoſite to the ſun, and conſequently on the ſame ſide to which the conical ſhadow is projected. They are eclipſed neareſt the diſc, when the planet is neareſt to its oppoſition.

Finally, the duration of theſe eclipſes anſwers to the time which ſhould elapſe while they traverſe the ſhadow of Jupiter.

Thus it appears that theſe ſatellites move from weſt to eaſt, in returning orbits round the planet. Obſervations of their eclipſes are the moſt exact means of determining their motions. Their mean ſidereal and ſynodical revolutions, as ſeen from the centre of Jupiter, are very accurately determined by comparing eclipſes at long intervals from each other, and obſerved near the oppoſition of the planet. It is thus diſcovered that the motion of the ſatellites of Jupiter is nearly circular and uniform, becauſe this hypotheſis correſponds very nearly with thoſe eclipſes which happen when we ſee this planet in the ſame poſition relatively to the ſun. Therefore, the poſitions of the ſatellites at every inſtant, as ſeen from the centre of Jupiter, may be determined. From hence reſults a ſimple and ſufficiently exact method of comparing with each other the diſtances of Jupiter and of the ſun from the earth:—a method which the ancient aſtronomers did not poſſeſs. For the parallax of Jupiter is inſenſible even to the preciſion of modern obſervations, when it is neareſt to us. They only judged of its diſtance by the time of its revolution; as they eſtimated thoſe planets to be the fartheſt from us, whoſe period of revolution was the longeſt.

Let us ſuppoſe that the total duration of an eclipſe of the third ſatellite has been obſerved. At the middle of the eclipſe, the ſatellite, ſeen from the centre of Jupiter, is nearly in oppoſition to the ſun. Its ſidereal poſition, obſerved from this centre, (which may eaſily be deduced from its mean motion,) is, therefore, the ſame as that of the centre of Jupiter ſeen from the centre of the ſun.

Direct obſervation, or the known motion of the ſun, gives the poſition of the earth as ſeen from its centre. Thus, ſuppoſing a triangle to be formed by the right lines which join the centres of the ſun, the earth, and Jupiter, we have given in this triangle the angle at the ſun, obſervation will give that at the earth, and we ſhall obtain the rectilinear diſtance from Jupiter to the earth and to the ſun, at the inſtant of the middle of the eclipſe, in parts of the diſtance from the ſun to the earth.

It is found by theſe means that Jupiter is at leaſt five times farther from us than the ſun, when its apparent diameter is 38′.3. The diameter of the earth, at the ſame diſtance, would not ſubtend an angle of 3″.5; the volume of Jupiter is, therefore, at leaſt a thouſand times greater than that of the earth.

The apparent diameters of theſe ſatellites being inſenſible, their magnitude cannot be exactly meaſured. An attempt has been made to appreciate it, by the time they take to penetrate the ſhadow of the planet. But there is a great diſcordance in the obſervations that have been made to aſcertain this circumſtance. This ariſes from the various powers of teleſcopes, the different degrees of perfection in the ſight of the obſerver, the ſtate of the atmoſphere, the altitude of the ſatellites above the horizon, their apparent diſtance from Jupiter, and the change of the hemiſphere preſented to us. The comparative brightneſs is independent of the four firſt cauſes, which only alter their proportional light, and ought, therefore, to afford information concerning the rotatory motion of theſe bodies. Dr. Herſchel, who is occupied in this delicate inveſtigation, has obſerved that they ſurpaſs each other alternately in brilliance:—a circumſtance which enables us to judge of the *maximum* and *minimum* of their light. The relation of this *maximum* and *minimum* to their mutual poſitions has perſuaded him, that they turn upon their own axis, like the moon in a period equal to the duration of their revolution round Jupiter: a reſult which Maraldi had already deduced with regard to the fourth ſatellite, from the returns of the ſame ſpot obſerved on its diſc in its paſſage over the planet.

The great diſtance of the celeſtial bodies weakens the phenomena which their ſurfaces preſent, till they are reduced to ſlight variations of light, which eſcape the firſt view, and are only rendered ſenſible by a long courſe of obſervations. But information derived from this ſource ought to be received with the greateſt caution; conſidering how much we may be miſled, on ſuch occaſions, by the effect of imagination.

TABLE I. Epochs of the Mean Longitude of Jupiter, with the Arguments of the Equations.

Years.		Mean Long.				Aphelion.				Node.				Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg IX.
		S.	D.	M.	S.	S.	D.	M.	S.	S.	D.	M.	S.								
Na. J. C.	0	4	29	32	41.8	5	12	46	27	2	20	53	8	2487	9957	2467	2290	511	981	220	234
	100	10	5	50	15.0	5	14	21	0	2	21	32	38	2841	6374	9237	5391	223	482	974	629
	1400	5	27	38	26.4	6	4	50	10	3	4	26	8	7451	9796	7270	7002	473	997	779	762
	1500	11	3	55	59.6	6	6	24	43	3	5	25	38	7806	6213	4040	0203	185	498	533	157
B. N. S.	1600	4	9	23	40.2	6	7	59	14	3	6	25	7	8145	2626	0772	3381	893	995	286	550
C.	1700	9	15	36	14.2	6	9	33	47	3	7	24	37	8500	9043	7543	6579	605	495	040	945
B.	1740	2	0	7	15.3	6	10	11	37	3	7	48	25	8641	5610	4251	9860	289	896	742	303
B.	1760	10	7	22	46.0	6	10	30	31	3	8	0	19	8712	8893	7605	6500	632	596	093	982
B.	1780	6	14	38	16.6	6	10	49	26	3	8	12	13	8783	2177	0959	3140	974	296	444	661
	1786	0	16	46	26.3	6	10	55	6	3	8	15	47	1804	3162	4966	8131	677	406	549	865
	1787	1	17	6	58.0	6	10	56	3	3	8	16	23	2308	3326	5633	8962	794	591	566	899
B.	1788	2	17	32	28.9	6	10	57	0	3	8	16	59	2812	3490	6301	9796	911	777	584	933
	1789	3	17	53	0.6	6	10	57	57	3	8	17	34	3315	3654	6969	0628	028	961	602	967
	1790	4	18	13	32.4	6	10	58	54	3	8	18	10	3819	3818	7636	1459	145	146	619	001
	1791	5	18	34	4.1	6	10	59	50	3	8	18	46	4322	3982	8304	2290	262	331	637	034
B.	1792	6	18	59	35.0	6	11	0	47	3	8	19	21	4826	4146	8971	3124	379	516	654	068
	1793	7	19	20	6.8	6	11	1	44	3	8	19	57	5329	4310	9639	3956	496	701	672	102
	1794	8	19	40	38.5	6	11	2	41	3	8	20	33	5833	4474	0307	4787	614	886	689	136
	1795	9	20	1	10.2	6	11	3	37	3	8	21	9	6337	4639	0974	5618	731	071	707	170
B.	1796	10	20	26	41.1	6	11	4	34	3	8	21	44	6840	4803	1642	6452	848	257	724	204
	1797	11	20	47	12.9	6	11	5	31	3	8	22	20	7344	4967	2310	7284	965	441	742	238
	1798	0	21	7	44.6	6	11	6	28	3	8	22	56	7847	5131	2977	8115	082	626	760	272
	1799	1	21	28	16.4	6	11	7	24	3	8	23	31	8351	5295	3645	8946	199	811	777	306
C.	1800	2	21	48	48.1	6	11	8	21	3	8	24	7	8854	5459	4313	9778	316	996	795	340
	1801	3	22	9	19.9	6	11	9	18	3	8	24	43	9358	5624	4981	0609	433	181	812	374
	1802	4	22	29	51.6	6	11	10	14	3	8	25	18	9861	5788	5648	1441	550	366	830	408
	1803	5	22	50	23.4	6	11	11	11	3	8	25	54	0365	5952	6316	2272	668	551	847	442
B.	1804	6	23	15	54.3	6	11	12	8	3	8	26	30	0868	6116	6984	3106	785	736	865	476
	1805	7	23	36	26.0	6	11	13	5	3	8	27	6	1372	6280	7651	3938	902	921	882	510
	1806	7	23	56	57.8	6	11	14	1	3	8	27	41	1876	6444	8319	4769	019	106	900	544
	1807	9	24	17	29.5	6	11	14	58	3	8	28	17	2379	6609	8987	5600	136	291	917	578
B.	1808	10	24	43	0.4	6	11	15	55	3	8	28	53	2883	6773	9655	6434	253	476	935	612
	1809	11	25	3	32.2	6	11	16	52	3	8	29	28	3386	6937	0322	7265	370	661	952	646
	1810	0	25	24	3.9	6	11	17	48	3	8	30	4	3890	7101	0990	8097	487	846	970	680
	1811	1	25	44	35.7	6	11	18	5	3	8	30	40	4393	7265	1658	8928	605	031	988	713
B.	1812	2	26	10	6.5	6	11	19	42	3	8	31	15	4897	7429	2325	9762	722	216	005	747
	1813	3	26	30	38.2	6	11	10	39	3	8	31	51	5401	7593	2993	0593	839	401	023	781
	1814	4	26	51	10.0	6	11	21	35	3	8	32	26	5904	7757	3660	1425	956	586	040	815
	1815	5	27	11	41.7	6	11	22	32	3	8	33	2	6408	7922	4328	2256	073	871	058	849
B.	1816	6	27	37	12.6	6	11	23	29	3	8	33	38	6911	8086	4996	3090	190	956	075	883
	1817	7	27	57	44.4	6	11	24	26	3	8	34	13	7415	8250	5664	3921	308	141	093	917
	1818	8	28	18	16.1	6	11	25	22	3	8	34	49	7918	8414	6331	4753	425	326	110	951
	1819	9	28	38	47.9	6	11	26	19	3	8	35	25	8422	8578	6999	5584	542	511	128	985
B.	1820	10	29	4	18.8	6	11	27	16	3	8	36	1	8925	8742	7667	6418	659	696	145	019

TABLE II. Mean Motion of Jupiter for *Julian Years*, with the Arguments of the Equations.

	Years.	Mot. in Long.				Mot. Aph.				Mot. Node.				Arg. II.	Arg III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
		S.	D.	M.	S.	S.	D.	M.	S.	S.	D.	M.	S.								
	1	1	0	20	31.7	0	0	0	57	0	0	0	36	0504	0164	0668	0831	117	185	018	034
	2	2	0	41	3.5	0	0	1	53	0	0	1	11	1007	0328	1335	1663	234	370	035	068
	3	3	1	1	35.2	0	0	2	50	0	0	1	47	1511	0493	2003	2494	351	555	053	102
B.	4	4	1	27	6.1	0	0	3	47	0	0	2	23	2014	0657	2671	3328	468	740	070	136
	5	5	1	47	37.9	0	0	4	44	0	0	2	58	2518	0821	3339	4159	586	925	088	170
	6	6	2	8	9.6	0	0	5	40	0	0	3	34	3021	0985	4006	4991	703	110	105	204
	7	7	2	28	41.4	0	0	6	37	0	0	4	10	3525	1149	4674	5822	820	295	123	238
B.	8	8	2	54	12.3	0	0	7	34	0	0	4	46	4028	1313	5342	6656	937	480	140	272
	9	9	3	14	44.0	0	0	8	31	0	0	5	21	4532	1478	6009	7488	054	665	158	306
	10	10	3	35	15.8	0	0	9	27	0	0	5	57	5035	1642	6677	8319	171	850	175	339
	11	11	3	55	47.5	0	0	10	24	0	0	6	33	5539	1806	7345	9150	288	035	193	373
B.	12	0	4	21	18.4	0	0	11	21	0	0	7	8	6043	1970	8012	9984	405	220	210	407
	13	1	4	41	50.1	0	0	12	18	0	0	7	44	6546	2134	8680	0816	523	405	228	441
	14	2	5	2	21.9	0	0	13	14	0	0	8	20	7050	2298	9348	1647	640	590	245	475
	15	3	5	22	53.6	0	0	14	11	0	0	8	56	7553	2463	0016	2478	757	775	263	509
B.	16	4	5	48	24.5	0	0	15	8	0	0	9	31	8057	2627	0683	3312	874	960	281	543
	17	5	6	8	56.3	0	0	16	4	0	0	10	7	8560	2791	1351	4144	991	145	298	577
	18	6	6	29	28.0	0	0	17	1	0	0	10	43	9064	2955	2019	4975	108	330	316	611
	19	7	6	49	59.8	0	0	17	58	0	0	11	18	9567	3119	2686	5806	225	515	333	645
B.	20	8	7	15	30.6	0	0	18	55	0	0	11	54	0071	3283	3354	6640	342	700	351	679
Bissextiles.	40	4	14	31	1.3	0	0	37	49	0	0	23	48	0142	6567	6708	3280	685	400	702	358
	60	0	21	46	31.9	0	0	56	44	0	0	35	42	0213	9850	0062	9920	027	101	052	037
	80	8	29	2	2.5	0	1	15	38	0	0	47	36	0284	3134	3416	6561	369	801	403	716
	100	5	6	17	33.2	0	1	34	33	0	0	59	30	0355	6417	6770	3201	712	501	754	395
	200	10	12	35	6.4	0	3	9	6	0	1	59	0	0709	2834	3541	6402	423	002	508	790
	300	3	18	52	39.6	0	4	43	39	0	2	58	30	1064	9251	0311	9602	135	504	262	184
	400	8	25	10	12.7	0	6	18	12	0	3	58	0	1418	5668	7081	2803	846	005	017	579
	500	2	1	27	45.9	0	7	52	45	0	4	57	30	1773	2085	3852	6004	558	506	771	974
	600	7	7	45	19.1	0	9	27	19	0	5	57	0	2128	5802	0622	9205	269	007	525	369
	700	0	14	2	52.3	0	11	1	52	0	6	56	30	2482	4920	7392	2406	981	508	279	764
	800	5	20	20	25.5	0	12	36	25	0	7	56	0	2837	1337	4162	5607	693	010	033	158
	900	10	26	37	58.7	0	14	10	58	0	8	55	30	3191	7754	0933	8807	404	511	787	553
	1000	4	2	55	31.8	0	15	45	31	0	9	55	0	3546	4171	7703	2008	116	012	542	948
	2000	8	5	51	3.7	1	1	31	2	0	19	50	0	7092	8342	5406	4017	231	024	083	896
	3000	0	8	46	35.5	1	17	16	33	0	29	45	0	0638	2513	3109	6025	347	036	625	844
	4000	4	11	42	7.4	2	3	2	4	1	9	49	0	4184	6684	0812	8033	463	048	166	792
	5000	8	14	37	39.2	2	18	47	35	1	19	35	0	7730	0856	8515	0042	579	059	708	740
	6000	0	17	33	11.0	3	4	33	6	1	29	30	0	1276	5027	6219	2050	694	071	249	688

JUPITER.

TABLE III. Mean Motion of Jupiter for *Months*, with the Arguments of the Equations.

Months.	Mot. Long.			Aph.	Node	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
	D.	M.	S.	Sec.	Sec.								
Jan.	0	0	0.0	0	0	0	0	0	0	0	0	0	0
Feb.	2	34	37.2	5	3	43	14	57	71	10	16	1	3
March	4	54	16.6	9	6	81	27	108	134	19	30	3	6
April	7	28	53.9	14	9	124	41	165	205	29	45	4	8
May	9	58	31 8	19	12	165	54	219	273	38	61	6	11
June	12	33	9 0	23	15	208	68	276	344	48	76	7	14
July	15	2	47.0	28	18	250	81	331	412	58	91	9	17
Aug.	17	37	24.2	33	21	292	95	388	483	68	107	10	20
Sept.	20	12	1.4	38	24	335	109	444	553	78	123	12	23
Oct.	22	41	39.4	42	27	376	123	499	622	88	138	13	25
Nov.	25	16	16.6	47	30	419	137	556	692	97	154	15	28
Dec.	27	45	54.5	52	33	460	150	611	761	107	169	16	31

TABLE IV. Mean Motion of Jupiter for *Hours* and *Minutes*.

Hours.	Mot. Lon.		Hours.	Mot. Lon.		Min.	Mot. Lon.	Min.	Mot. Lon.
	M.	S.		M.	S.		Sec.		Sec.
1	0	12 5	13	2	42.1	1	0.2	27	5.6
2	0	24.9	14	2	54.6	2	0.4	30	6.2
3	0	37.4	15	3	7.0	3	0.6	33	6.9
4	0	49.9	16	3	19.5	4	0.8	36	7.5
5	1	2.3	17	3	32.0	5	1.0	39	8.1
6	1	14.8	18	3	44.4	6	1.2	42	8.7
7	1	27.3	19	3	56.9	9	1.9	45	9.4
8	1	39.8	20	4	9 4	12	2.5	48	10.0
9	1	52.2	21	4	21.9	15	3.1	51	10.6
10	2	4.7	22	4	34.3	18	3.7	54	11.2
11	2	17.2	23	4	46.8	21	4.4	57	11.8
12	2	29.6	24	4	59.3	24	5.0	60	12.5

TABLE V. Mean Motion of Jupiter for *Days*, with the Arguments of the Equations.

Days of the Month.	Motion in Longitude.			Mot. Aphel.	Mot. Node.	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
	D.	M.	S.	Sec.	Sec.								
1	0	4	59 3	0	0	1	0	2	2	0	1	0	0
2	0	9	58.5	0	0	3	1	4	5	1	1	0	0
3	0	14	57.8	0	0	4	1	5	7	1	2	0	0
4	0	19	57.1	1	0	6	2	7	9	1	2	0	0
5	0	24	56.3	1	0	7	2	9	11	2	3	0	0
6	0	29	55.6	1	1	8	3	11	14	2	3	0	1
7	0	34	54.9	1	1	10	3	13	16	2	4	0	1
8	0	39	54.1	1	1	11	4	15	18	3	4	0	1
9	0	44	53.4	1	1	12	4	16	20	3	5	0	1
10	0	49	52.7	2	1	14	5	18	23	3	5	0	1
11	0	54	51.9	2	1	15	5	20	25	4	6	1	1
12	0	59	51.2	2	1	16	5	22	27	4	6	1	1
13	1	4	50.4	2	1	17	6	24	30	4	7	1	1
14	1	9	49.7	2	1	19	6	26	32	4	7	1	1
15	1	14	49.0	2	1	21	7	27	34	5	8	1	1
16	1	19	48.2	3	2	22	7	29	36	5	8	1	2
17	1	24	47.5	3	2	23	8	31	39	5	9	1	2
18	1	29	46.8	3	2	25	8	33	41	6	9	1	2
19	1	34	46.0	3	2	26	9	35	43	6	10	1	2
20	1	39	45.3	3	2	28	9	37	46	6	10	1	2
21	1	44	44.6	3	2	29	9	38	48	7	11	1	2
22	1	49	43.8	3	2	30	10	40	50	7	11	1	2
23	1	54	43.1	4	2	32	10	42	52	7	12	1	2
24	1	59	42.4	4	2	33	11	44	55	8	12	1	2
25	2	4	41.6	4	2	35	11	46	57	8	13	1	2
26	2	9	40.9	4	3	36	12	48	59	8	13	1	2
27	2	14	40.2	4	3	37	12	49	61	9	14	1	3
28	2	19	39.4	4	3	39	13	51	64	9	14	1	3
29	2	24	38.7	5	3	40	13	53	66	9	15	1	3
30	2	29	38.0	5	3	41	13	55	68	10	15	1	3
31	2	34	37.2	5	3	43	14	57	71	10	16	1	3

In the Months January and February of a Biſſextile Year, ſubtract 1 from the given Day of the Month.

TABLE VI. The great Inequality of the Motion of Jupiter, with the Corrections of the Arguments which regulate the other Inequalities.

Years.	Equations. M.	Equations. S.	Diff. Sec.	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
1550	− 1	18.5	86.2	− 2	− 3	− 5	− 9	− 1	− 0	+ 0	+ 0
1560	+ 0	7.7	86.0	+ 0	+ 0	+ 0	+ 1	+ 0	+ 0	− 0	− 0
1570	1	33.7	85.4	2	4	6	11	1	1	− 1	0
1580	2	59.1	84.6	5	8	12	18	2	1	− 1	0
1590	4	23.7	83.3	7	12	18	30	3	2	− 2	0
1600	5	47.0	81.6	9	15	24	39	3	2	− 2	− 1
1610	7	8.6	79.6	11	19	30	49	4	3	− 3	− 1
1620	8	28.2	77.1	13	22	35	58	5	3	− 3	− 1
1630	9	45.3	74.3	15	27	41	66	6	3	− 4	− 1
1640	10	59.6	71.2	17	29	46	75	6	4	− 4	− 1
1650	12	10.8	67.7	19	32	51	83	7	4	− 4	− 1
1660	13	18.5	63.9	21	35	56	91	8	5	− 5	− 1
1670	14	22.4	59.9	22	38	60	98	8	5	− 5	− 2
1680	15	22.3	55.4	24	40	64	105	9	5	− 6	− 2
1690	16	17.7	50.9	25	43	68	111	9	6	− 6	− 2
1700	17	8.6	46.0	27	45	72	117	10	6	− 6	− 2
1710	17	54.6	41.1	28	47	75	122	10	6	− 7	− 2
1720	18	35.6	35.6	29	49	78	127	11	7	− 7	− 2
1730	19	11.2	30.3	30	50	80	131	11	7	− 7	− 2
1740	19	41.5	24.7	30	52	82	134	11	7	− 7	− 2
1750	20	6.2	19.1	31	53	84	137	12	7	− 7	− 2
1760	20	25.3	13.3	32	54	85	139	12	7	− 8	− 2
1770	20	38.6	7.4	32	54	86	141	12	7	− 8	− 2
1780	20	46.0	1.7	32	55	87	141	12	7	− 8	− 2
1790	20	47.7	−4.2	32	55	87	142	12	7	− 8	− 2
1800	20	43.5	10.0	32	54	87	141	12	7	− 8	− 2
1810	20	33.5	15.8	32	54	86	140	12	7	− 8	− 2
1820	20	17.7	21.5	31	53	85	138	12	7	− 7	− 2
1830	19	56.2	27.1	31	52	83	136	11	7	− 7	− 2
1840	19	29.1	32.5	30	51	81	133	11	7	− 7	− 2
1850	18	56.6	37.8	29	50	79	129	11	7	− 7	− 2
1860	18	18.8	42.9	28	48	77	125	10	6	− 7	− 2
1870	17	35.9	47.9	27	46	74	120	10	6	− 6	− 2
1880	16	48.0	52.7	26	44	70	114	10	6	− 6	− 8
1890	15	55.3	56.9	25	42	67	109	9	6	− 6	− 2
1900	14	58.4	61.1	23	39	62	102	9	5	− 5	− 2
1910	13	57.3	65.1	22	37	58	95	8	5	− 5	− 2
1920	12	52.2	68.6	20	34	54	88	7	5	− 5	− 2
1930	11	43.6	71.8	18	31	49	80	7	4	− 4	− 1
1940	10	31.8	74.8	16	28	44	72	6	4	− 4	− 1
1950	9	17.0	77.3	14	25	39	64	5	3	− 3	− 1
1960	7	59.7	79.5	12	21	33	54	5	3	− 3	− 1
1970	6	40.2	81.4	10	18	28	45	4	2	− 2	− 1
1980	5	18.8	82.8	8	14	22	36	3	2	− 2	− 1
1990	3	56.0	83.8	6	10	16	27	2	1	− 1	− 0
2000	2	32.2	84.5	4	7	10	17	1	1	− 1	− 0
2010	+ 1	7.7	84.7	+ 2	+ 3	+ 5	+ 8	+ 1	+ 0	− 0	[illegible]
2020	− 0	17.0		− 0	− 0	− 1	− 2	− 0	− 0	+ 0	+ 0

TABLE VII. Equation of Jupiter's Orbit for 1750, with the Secular Variation.

Argument. Long. ♃ cor. by Tab. VI.—Aphelion, or mean Anomaly.

Degrees.	Sig. O.			Sig. I.			Sig. II.			Degrees.
	Equation.	Diff.	Sec. Var.	Equation.	Diff.	Sec. Var.	Equation.	Diff.	Sec. Var.	
	—		—	—		—	—		—	
	D. M. S.	M. S.	Sec.	D. M. S.	M. S.	Sec.	D. M. S.	M. S.	Sec.	
0	0 0 0.0		0.00	2 37 1.8		25.00	4 37 36.3		45.06	30
1	0 5 26.5	5 26.5	0.86	2 41 49.9	4 48.1	25.79	4 40 36.1	2 59.8	45.58	29
2	0 10 52.9	5 26.4	1.72	2 46 35.4	4 45.5	26.55	4 43 31.3	2 55.2	46.10	28
3	0 16 19.1	5 26.2	2.58	2 51 18.4	4 43.0	27.31	4 46 21.8	2 50.5	46.61	27
4	0 21 45.1	5 26.0	3.44	2 55 58.7	4 40.3	28.08	4 49 7.5	2 45.7	47.09	26
5	0 27 10.7	5 25.6	4.31	3 0 36.2	4 37.5	28.83	4 51 48.3	2 40.8	47.57	25
6	0 32 35.9	5 25.2	5.16	3 5 10.8	4 34.6	29.57	4 54 24.2	2 35.9	48.03	24
7	0 38 0.6	5 24.7	6.01	3 9 42.5	4 31.7	30.32	4 56 55.1	2 30.9	48.49	23
8	0 43 24.8	5 24.2	6.88	3 14 11.2	4 28.7	31.04	4 59 21.0	2 25.9	48.94	22
9	0 48 48.3	5 23.5	7.73	3 18 36.8	4 25.6	31.77	5 1 41.9	2 20.9	49.37	21
10	0 54 11.0	5 22.7	8.57	3 22 59.4	4 22.6	32.48	5 3 57.6	2 15.7	49.78	20
11	0 59 32.9	5 21.9	9.42	3 27 18.7	4 19.3	33.20	5 6 8.2	2 10.6	50.18	19
12	1 4 53.9	5 21.0	10.27	3 31 34.7	4 16.0	33.90	5 8 13.5	2 5.3	50.57	18
13	1 10 14.0	5 20.1	11.12	3 35 47.3	4 12.6	34.60	5 10 13.5	2 0.0	50.95	17
14	1 15 32.9	5 18.9	11.97	3 39 56.5	4 9.2	35.29	5 12 8.2	1 54.7	51.31	16
15	1 20 50.5	5 17.6	12.81	3 44 2.1	4 5.6	35.97	5 13 57.5	1 49.3	51.65	15
16	1 26 7.0	5 16.5	13.65	3 48 4.1	4 2.0	36.63	5 15 41.4	1 43.9	51.99	14
17	1 31 22.3	5 15.3	14.49	3 52 2.5	3 58.4	37.30	5 17 19.8	1 38.4	52.32	13
18	1 36 36.1	5 13.8	15.32	3 55 57.3	3 54.8	37.95	5 18 52.7	1 32.9	52.62	12
19	1 41 48.3	5 12.2	16.15	3 59 48.1	3 50.8	38.59	5 20 20.0	1 27.3	52.91	11
20	1 46 59.0	5 10.7	16.98	4 3 35.0	3 46.9	39.23	5 21 41.8	1 21.8	53.20	10
21	1 52 8.0	5 9.0	17.80	4 7 18.0	3 43.0	39.86	5 22 57.9	1 16.1	53.46	9
22	1 57 15.4	5 7.4	18.62	4 10 57.0	3 39.0	40.49	5 24 8.3	1 10.4	53.71	8
23	2 2 20.9	5 5.5	19.43	4 14 31.9	3 34.9	41.08	5 25 13.0	1 4.7	53.94	7
24	2 7 24.5	5 3.6	20.24	4 18 2.6	3 30.7	41.68	5 26 11.9	0 58.9	54.17	6
25	2 12 26.1	5 1.6	21.05	4 21 29.1	3 26.5	42.27	5 27 5.0	0 53.1	54.38	5
26	2 17 25.7	4 59.6	21.85	4 24 51.4	3 22.3	42.85	5 27 52.3	0 47.3	54.56	4
27	2 22 23.1	4 57.4	22.65	4 28 9.3	3 17.9	43.41	5 28 33.7	0 41.4	54.73	3
28	2 27 18.3	4 55.2	23.44	4 31 22.8	3 13.5	43.97	5 29 9.2	0 35.5	54.89	2
29	2 32 11.2	4 52.9	24.22	4 34 31.8	3 9.0	44.52	5 29 38.9	0 29.7	55.02	1
30	2 37 1.8	4 50.6	25.00	4 37 36.3	3 4.5	45.06	5 30 2.6	0 23.7	55.15	0
	+ Sig. XI.		+	+ Sig. X.		+	+ Sig. IX.		+	

Table VII. Equation of Jupiter's Orbit for 1750, with the Secular Variation.

Argument. Long. ♃ cor. by Tab. VI.—Aphelion, or mean Anomaly.

Degrees.	Sig. III.			Sig. IV.			Sig. V.			Degr.
	Equation.	Diff.	Sec. Var.	Equation.	Diff.	Sec. Var.	Equation.	Diff.	Sec. Var.	
	—		—	—		—	—		—	
	D. M. S.	M. S.	Sec.	D. M. S.	M. S.	Sec.	D. M. S.	M. S.	Sec.	
0	5 30 2.6	0 17.7	55.15	4 54 45.6	2 44.2	50.75	2 54 15.1	5 11.8	30.78	30
1	5 30 20.3	0 11.7	55.26	4 52 1.4	2 50.1	50.40	2 49 3.3	5 15.5	29.88	29
2	5 30 32.0	+0 5.7	55.35	4 49 11.3	2 55.8	49.97	2 43 47.8	5 19.0	28.96	28
3	5 30 37.7	−0 0.3	55.43	4 46 15.5	3 1.5	49.51	2 38 28.8	5 22.4	28.03	27
4	5 30 37.4	0 6.4	55.48	4 43 14.0	3 7.3	49.03	2 33 6.4	5 25.7	27.09	26
5	5 30 31.0	0 12.5	55.52	4 40 6.7	3 12.8	48.53	2 27 40.7	5 28.9	26.15	25
6	5 30 18.5	0 18.6	55.55	4 36 53.9	3 18.5	48.02	2 22 11.8	5 32.0	25.19	24
7	5 29 59.9	0 24.6	55.56	4 33 35.4	3 24.0	47.48	2 16 39.8	5 34.9	24.23	23
8	5 29 35.3	0 30.8	55.55	4 30 11.4	3 29.5	46.95	2 11 4.9	5 37.7	23.25	22
9	5 29 4.5	0 37.0	55.52	4 26 41.9	3 34.9	46.38	2 5 27.2	5 40.4	22.26	21
10	5 28 27.5	0 43.0	55.48	4 23 7.0	3 40.3	45.79	1 59 46.8	5 43.0	21.26	20
11	5 27 44.5	0 49.1	55.41	4 19 26.7	3 45.7	45.19	1 54 3.8	5 45.5	20.25	19
12	5 26 55.4	0 55.3	55.33	4 15 41.0	3 50.9	44.57	1 48 18.3	5 47.9	19.24	18
13	5 26 0.1	1 1.6	55.24	4 11 50.1	3 55.9	43.92	1 42 30.4	5 50.2	18.21	17
14	5 24 58.5	1 7.6	55.11	4 7 54.2	4 1.1	43.29	1 36 40.2	5 52.2	17.19	16
15	5 23 50.9	1 13.8	54.99	4 3 53.1	4 6.3	42.63	1 30 48.0	5 54.2	16.15	15
16	5 22 37.1	1 19.8	54.85	3 59 46.8	4 11.2	41.95	1 24 53.8	5 56.0	15.10	14
17	5 21 17.3	1 26.0	54.67	3 55 35.6	4 16.1	41.24	1 18 57.8	5 57.8	14.04	13
18	5 19 51.3	1 32.2	54.49	3 51 19.5	4 20.9	40.52	1 13 0.0	5 59.4	12.98	12
19	5 18 19.1	1 38.3	54.28	3 46 58.6	4 25.6	39.80	1 7 0.6	6 0.8	11.92	11
20	5 16 40.8	1 44.4	54.06	3 42 33.0	4 30.3	39.04	1 0 59.8	6 2.1	10.85	10
21	5 14 56.4	1 50.5	53.81	3 38 2.7	4 34.8	38.20	0 54 57.7	6 3.4	9.79	9
22	5 13 5.9	1 56.5	53.56	3 33 27.9	4 39.4	37.50	0 48 54.3	6 4.5	8.72	8
23	5 11 9.4	2 2.6	53.29	3 28 48.5	4 43.7	36.72	0 42 49.8	6 5.3	7.63	7
24	5 9 6.8	2 8.6	52.99	4 24 4.8	4 48.0	35.91	0 36 44.5	6 6.1	6.54	6
25	5 6 58.2	2 14.7	52.67	3 19 16.8	4 52.3	35.08	0 30 38.4	6 6.8	5.45	5
26	5 4 43.5	2 20.5	52.35	3 14 24.5	4 56.4	34.26	0 24 31.6	6 7.4	4.36	4
27	5 2 23.0	2 26.6	51.99	3 9 28.1	5 0.5	33.40	0 18 24.2	6 7.9	3.28	3
28	4 59 56.4	2 32.5	51.62	3 4 27.6	5 4.4	32.55	0 12 16.3	6 8.1	2.18	2
29	4 57 23.9	2 38.3	51.22	2 59 23.2	5 8.1	31.67	0 6 8.2	6 8.2	1.10	1
30	4 54 45.6		50.82	2 54 15.1		30.78	0 0 0.0		0.00	0
	+ Sig. VIII.		+	+ Sig. VII.		+	+ Sig. VI.		+	

TABLE VIII. Equation II.

Arg. II.	Equat. II. M.	S.	Diff. Sec.	Arg II.	Equat. II. M.	S.	Diff. Sec.	Arg. II.	Equat. II. M.	S.	Diff. Sec.
0	4	14.7	24.6	3400	0	5.2	4.2	6700	8	17.2	9.9
100	4	39.3	24.0	3500	0	1.0	1.0	6800	8	7.3	12.6
200	5	3.3	22.9	3600	0	0.0	1.9	6900	7	54.7	15.0
300	5	26.2	21.2	3700	0	1.9	4.9	7000	7	39.7	17.4
400	5	47.4	19.3	3800	0	6.8	8.0	7100	7	22.3	19.5
500	6	6.7	16.7	3900	0	14.8	10.9	7200	7	2.8	21.4
600	6	23.4	13.7	4000	0	25.7	13.7	7300	6	41.4	22.8
700	6	37.1	10.9	4100	0	39.4	16.4	7400	6	18.6	24.2
800	6	48.0	7.1	4200	0	55.8	18.9	7500	5	54.4	25.0
900	6	55.1	3.7	4300	1	14.7	21.2	7600	5	29.4	25.7
1000	6	58.8	0.2	4400	1	35.9	23.2	7700	5	3.7	26.0
1100	6	59.0	3.5	4500	1	59.1	25.0	7800	4	37.7	25.6
1200	6	55.5	6.9	4600	2	24.1	26.3	7900	4	12.1	25.1
1300	6	48.6	10.2	4700	2	50.4	27.5	8000	3	47.0	23.9
1400	6	38.4	13.4	4800	3	17.9	28.3	8100	3	23.1	22.9
1500	6	25.0	16.2	4900	3	46.2	28.5	8200	3	0.2	20.9
1600	6	8.8	18.7	5000	4	14.7	28.5	8390	2	39.3	18.7
1700	5	50.1	20.9	5100	4	43.2	28.3	8490	2	20.6	16.2
1800	5	29.2	22.9	5200	5	11.5	27.5	8500	2	4.4	13.4
1900	5	6.3	23.9	5300	5	39.0	26.3	8600	1	51.0	10.2
2000	4	42.4	25.1	5400	6	5.3	25.0	8700	1	40.8	6.9
2100	4	17.3	25.6	5500	6	30.3	23.2	8800	1	33.9	3.5
2200	3	51.7	26.0	5600	6	53.5	21.2	8900	1	30.4	0.2
2300	3	25.7	25.7	5700	7	14.7	18.9	9000	1	30.6	3.7
2400	3	0.0	25.0	5800	7	33.6	16.4	9100	1	34.3	7.1
2500	2	35.0	24.2	5900	7	50.0	13.7	9200	1	41.4	10.9
2600	2	10.8	22.8	6000	8	3.7	10.9	9300	1	52.3	13.7
2700	1	48.0	21.4	6100	8	14.6	8.0	9400	2	6.0	16.7
2800	1	26.0	19.5	6200	8	22.6	4.9	9500	2	22.7	19.3
2900	1	7.1	17.4	6300	8	27.5	1.9	9600	2	42.0	21.2
3000	0	49.7	15.0	6400	8	29.4	1.0	9700	3	3.2	22.9
3100	0	34.7	12.6	6500	8	28.4	4.2	9800	3	26.1	24.0
3200	0	22.1	9.9	6600	8	24.2	7.0	9900	3	50.1	24.6
3300	0	12.2	7.0	6700	8	17.2		10000	4	14.7	
3400	0	5.2									

TABLE IX. Equation III.

Arg. III.	Equat. III. M.	S.	Diff. Sec.	Arg. III.	Equat. III. M.	S.	Diff. Sec.	Arg. III.	Equat. III. M.	S.	Diff. Sec.
0	1	46.0	8.5	3400	4	29.4	3.1	6700	0	36.1	5.7
100	1	54.5	8.6	3500	4	26.3	3.6	6800	0	30.4	5.2
200	2	3.1	8.6	3600	4	22.7	4.0	6900	0	25.2	4.8
300	2	11.7	8.7	3700	4	18.7	4.5	7000	0	20.4	4.3
400	2	20.4	8.7	3800	4	14.2	5.0	7100	0	16.1	3.8
500	2	29.1	8.7	3900	4	9.2	5.5	7200	0	12.3	3.4
600	2	37.8	8.6	4000	4	3.7	5.8	7300	0	8.9	2.8
700	1	46.4	8.4	4100	3	57.9	6.2	7400	0	6.1	2.3
800	2	54.8	8.3	4200	3	51.7	6.6	7500	0	3.8	1.7
900	3	3.1	8.2	4300	3	45.1	7.0	7600	0	2.1	1.2
1000	3	11.3	7.9	4400	3	38.1	7.3	7700	0	0.9	0.7
1100	3	19.2	7.7	4500	3	30.8	7.6	7800	0	0.2	0.2
1200	3	26.9	7.4	4600	3	23.2	7.8	7900	0	0.0	0.4
1300	3	34.3	7.1	4700	3	15.4	8.0	8000	0	0.4	1.0
1400	3	41.4	6.8	4800	3	7.4	8.2	8100	0	1.4	1.5
1500	3	48.2	6.4	4900	2	59.2	8.4	8200	0	2.9	2.0
1600	3	54.6	6.1	5000	2	50.8	8.5	8300	0	4.9	2.5
1700	4	0.7	5.7	5100	2	42.3	8.6	8400	0	7.4	13.
1800	4	6.4	5.2	5200	2	33.7	8.6	8500	0	10.5	3.6
1900	4	11.6	4.8	5300	2	25.1	8.7	8600	0	14.1	4.0
2000	4	16.4	4.3	5400	2	16.4	8.7	8700	0	18.1	4.5
2100	4	20.7	3.8	5500	2	7.7	8.7	8800	0	22.6	5.0
2200	4	24.5	3.4	5600	1	59.0	8.6	8900	0	27.6	5.5
2300	4	27.9	2.8	5700	1	50.4	8.4	9000	0	33.1	5.8
2400	4	30.7	2.3	5800	1	42.0	8.3	9100	0	38.9	6.2
2500	4	33.0	1.7	5900	1	33.7	8.2	9200	0	45.1	6.6
2600	4	34.7	1.2	6000	1	25.5	7.9	9300	0	51.7	7.0
2700	4	35.9	0.7	6100	1	17.6	7.7	9400	0	58.7	7.3
2800	4	36.6	0.2	6200	1	9.9	7.4	9500	1	6.0	7.6
2900	4	36.8	0.4	6300	1	2.5	7.1	9600	1	13.[illegible]	7.8
3000	4	36.4	1.0	6400	0	55.4	6.8	9700	1	21.4	8.0
3100	4	35.4	1.5	6500	0	48.6	6.4	9800	1	29.4	8.2
3200	4	33.9	2.0	6600	0	42.2	6.1	9900	1	37.6	8.4
3300	4	31.9	2.5	6700	0	36.1		10000	1	46.0	
3400	4	29.4									

JUPITER.

Table X. Equation IV.

Argument IV.

Arg. IV.	Equat. IV. M.	s.	Diff. Sec.	Arg. IV.	Equat. IV. M.	s.	Diff. Sec.	Arg. IV.	Equat. IV. M.	s.	Diff. Sec.
0	0	10.2	2.8	3400	2	43.4	2.5	6700	1	28.6	5.5
100	0	13.0	3.0	3500	2	45.9	2.3	6800	1	23.1	5.4
200	0	16.0	3.3	3600	2	48.2	2.0	6900	1	17.7	5.5
300	0	19.3	3.6	3700	2	50.2	1.5	7000	1	12.2	5.3
400	0	22.9	3.8	3800	2	51.7	1.3	7100	1	6.9	5.3
500	0	26.7	4.1	3900	2	53.0	0.9	7200	1	1.6	5.2
600	0	30.8	4.2	4000	2	53.9	0.6	7300	0	56.4	5.1
700	0	35.0	4.5	4100	2	54.5	0.3	7400	0	51.3	4.9
800	0	39.5	4.7	4200	2	54.8	0.0	7500	0	46.4	4.8
900	0	44.2	4.9	4300	2	54.8	0.4	7600	0	41.6	4.6
1000	0	49.1	5.0	4400	2	54.4	0.8	7700	0	37.0	4.3
1100	0	54.1	5.2	4500	2	53.6	1.2	7800	0	32.7	4.2
1200	0	59.3	5.2	4600	2	52.4	1.5	7900	0	28.5	4.0
1300	1	4.5	5.3	4700	2	50.9	1.8	8000	0	24.5	3.7
1400	1	9.8	5.4	4800	2	49.1	2.1	8100	0	20.8	3.4
1500	1	15.2	5.5	4900	2	47.0	2.4	8200	0	17.4	3.1
1600	1	20.7	5.5	5000	2	44.6	2.8	8300	0	14.3	2.9
1700	1	26.2	5.5	5100	2	41.8	3.0	8400	0	11.4	2.5
1800	1	31.7	5.4	5200	2	38.8	3.3	8500	0	8.9	2.3
1900	1	37.1	5.5	5300	2	35.5	3.6	8600	0	6.6	2.0
2000	1	42.6	5.3	5400	2	31.9	3.8	8700	0	4.6	1.5
2100	1	47.9	5.3	5500	2	28.1	4.1	8800	0	3.1	1.3
2200	1	53.2	5.2	5600	2	24.0	4.2	8900	0	1.8	0.9
2300	1	58.4	5.1	5700	2	19.8	4.5	9000	0	0.9	0.6
2400	2	3.5	4.9	5800	2	15.3	4.7	9100	0	0.3	0.3
2500	2	8.4	4.8	5900	2	10.6	4.9	9200	0	0.0	0.0
2600	2	13.2	4.6	6000	2	5.7	5.0	9300	0	0.0	0.4
2700	2	17.8	4.3	6100	2	0.7	5.2	9400	0	0.4	0.8
2800	2	22.1	4.2	6200	1	55.5	5.2	9500	0	1.2	1.2
2900	2	26.3	4.0	6300	1	50.3	5.3	9600	0	2.4	1.5
3000	2	30.3	3.7	6400	1	45.0	5.4	9700	0	3.9	1.8
3100	2	34.0	3.4	6500	1	39.6	5.5	9800	0	5.7	2.1
3200	2	37.4	3.1	6600	1	34.1	5.5	9900	0	7.8	2.4
3300	2	40.5	2.9	6700	1	28.6		10000	0	10.2	
3400	2	43.4									

Table XI. Equation V.

Argument V.

Arg. V.	Equat. V. M.	s.	Diff. Sec.	Arg. V.	Equat. V. M.	s.	Diff. Sec.	Arg. V.	Equat. V. M.	s.	Diff. Sec.
0	5	4.3	5.7	3400	2	53.7	10.5	6700	0	17.6	4.9
100	5	10.0	5.2	3500	2	43.2	10.5	6800	0	22.5	5.6
200	5	15.2	4.5	3600	2	32.7	10.4	6900	0	28.1	6.1
300	5	19.7	3.9	3700	2	22.3	10.3	7000	0	34.2	6.6
400	5	23.6	3.4	3800	2	12.0	10.2	7100	0	40.8	[illegible]
500	5	27.0	2.7	3900	2	1.8	10.0	7200	0	[illegible]	[illegible]
600	5	29.7	2.0	4000	1	51.8	9.8	[illegible]	[illegible]	[illegible]	[illegible]
700	5	31.7	1.3	4100	1	42.0	9.5	7400	1	[illegible]	[illegible]
800	5	33.0	0.8	4200	1	32.5	9.2	7500	1	[illegible]	8.8
900	5	33.8	0.2	4300	1	23.3	9.0	7600	1	20.8	9.1
1000	5	34.0	0.6	4400	1	14.3	8.5	7700	1	29.9	9.5
1100	5	33.4	1.3	4500	1	5.8	8.1	7800	1	39.4	9.7
1200	5	32.1	1.8	4600	0	57.7	7.7	7900	1	49.1	9.9
1300	5	30.3	2.5	4700	0	50.0	7.3	8000	1	59.0	10.2
1400	5	27.8	3.2	4800	0	42.7	6.8	8100	2	9.2	10.4
1500	5	24.6	3.8	4900	0	35.9	6.2	8200	2	19.6	10.3
1600	5	20.8	4.4	5000	0	29.7	5.7	8300	2	[illegible]	10.4
1700	5	16.4	4.9	5100	0	24.0	5.2	8400	2	[illegible]	10.5
1800	5	11.5	5.6	5200	0	18.8	4.5	8500	2	50.8	10.5
1900	5	5.9	6.1	5300	0	14.3	3.9	8600	3	1.3	10.4
2000	4	59.8	6.6	5400	0	10.4	3.4	8700	3	11.7	10.3
2100	4	53.2	7.2	5500	0	7.0	2.7	8800	3	22.0	10.2
2200	4	46.0	7.6	5600	0	4.3	2.0	8900	3	32.2	10.0
2300	4	38.4	8.0	5700	0	2.3	1.3	9000	3	42.2	9.8
2400	4	30.4	8.4	5800	0	1.0	0.8	9100	3	52.0	9.5
2500	4	22.0	8.8	5900	0	0.2	0.2	9200	4	1.5	9.2
2600	4	13.2	9.1	6000	0	0.0	0.6	9300	4	10.7	9.0
2700	4	4.1	9.5	6100	0	0.6	1.3	9400	4	19.7	[illegible]
2800	3	54.6	9.7	6200	0	1.9	1.8	9500	4	[illegible]	[illegible]
2900	3	44.9	9.9	6300	0	3.7	2.5	9600	4	[illegible]	[illegible]
3000	3	35.0	10.2	6400	0	6.2	3.2	9700	4	[illegible]	7.3
3100	3	24.8	10.4	6500	0	9.4	3.8	9800	4	[illegible]	[illegible]
3200	3	14.4	10.3	6600	0	13.2	4.4	9900	4	[illegible]	[illegible]
3300	3	4.1	10.4	6700	0	17.6		10000	5	4.3	
3400	2	53.7									

Table XII. Equation VI.

Argument VI.					
Arg. VI.	Equat. VI. Sec.	Arg. VI.	Equat. VI. Sec.	Arg. VI.	Equat. VI. Sec.
0	30.2	340	2.2	670	15.5
10	29.7	350	1.7	680	16.5
20	29.2	360	1.3	690	17.5
30	28.6	370	1.0	700	18.5
40	28.0	380	0.7	710	19.5
50	27.3	390	0.4	720	20.5
60	26.5	400	0.2	730	21.5
70	25.8	410	0.1	740	22.4
80	25.0	420	0.0	750	23.3
90	24.1	430	0.0	760	24.2
100	23.2	440	0.1	770	25.1
110	22.3	450	0.2	780	25.9
120	21.4	460	0.4	790	26.6
130	20.4	470	0.7	800	27.4
140	19.5	480	1.0	810	28.1
150	18.5	490	1.3	820	28.7
160	17.5	500	1.8	830	29.3
170	16.5	510	2.3	840	29.8
180	15.5	520	2.8	850	30.3
190	14.5	530	3.4	860	30.7
200	13.5	540	4.0	870	31.0
210	12.5	550	4.7	880	31.3
220	11.5	560	5.5	890	31.6
230	10.5	570	6.2	900	31.8
240	9.6	580	7.0	910	31.9
250	8.7	590	7.9	920	32.0
260	7.8	600	8.8	930	32.0
270	6.9	610	9.7	940	31.9
280	6.1	620	10.6	950	31.8
290	5.4	630	11.6	960	31.6
300	4.6	640	12.5	970	31.3
310	3.9	650	13.5	980	31.0
320	3.3	660	14.5	990	30.7
330	2.7	670	15.5	1000	30.2
340	2.2				

Table XIII. Equation VII.

Argument VII.					
Arg. VII.	Equat. VII. Sec.	Arg. VII.	Equat. VII. Sec.	Arg. VII.	Equat VII. Sec.
0	10.9	340	24.5	670	2.6
10	11.7	350	24.1	680	2.2
20	12.5	360	23.7	690	1.8
30	13.3	370	23.4	700	1.4
40	14.1	380	22.9	710	1.0
50	14.9	390	22.3	720	0.7
60	15.7	400	21.8	730	0.5
70	16.5	410	21.2	740	0.2
80	17.3	420	20.6	750	0.1
90	18.0	430	19.9	760	0.0
100	18.7	440	19.2	770	0.0
110	19.4	450	18.5	780	0.0
120	20.0	460	18.0	790	0.1
130	20.7	470	17.1	800	0.2
140	21.3	480	16.2	810	0.4
150	21.9	490	15.4	820	0.6
160	22.5	500	14.7	830	0.8
170	23.0	510	13.9	840	1.1
180	23.4	520	13.1	850	1.5
190	23.8	530	12.3	860	1.9
200	24.2	540	11.5	870	2.2
210	24.6	550	10.7	880	2.7
220	24.9	560	9.9	890	3.3
230	25.1	570	9.1	900	3.8
240	25.4	580	8.3	910	4.4
250	25.5	590	7.6	920	5.0
260	25.6	600	6.9	930	5.7
270	25.6	610	6.2	940	6.4
280	25.6	620	5.6	950	7.1
290	25.5	630	4.9	960	7.8
300	25.4	640	4.3	970	8.5
310	25.2	650	3.7	980	9.4
320	25.0	660	3.1	990	10.2
330	24.8	670	2.6	1000	10.9
340	24.5				

JUPITER.

TABLE XIV. Equation VIII.

Argument VIII.					
Arg. VIII.	Equat. VIII.	Arg. VIII.	Equat. VIII.	Arg. VIII.	Equat. VIII.
	Sec.		Sec.		Sec.
0	24.1	340	1.4	670	13.6
10	23.6	350	1.0	680	14.5
20	23.1	360	0.7	690	15.3
30	22.5	370	0.5	700	16.1
40	21.9	380	0.3	710	16.8
50	21.4	390	0.1	720	17.6
60	20.8	400	0.1	730	18.4
70	20.1	410	0.0	740	19.1
80	19.4	420	0.0	750	19.8
90	18.7	430	0.1	760	20.4
100	18.0	440	0.2	770	21.0
110	17.2	450	0.4	780	21.7
120	16.4	460	0.6	790	22.3
130	15.6	470	0.8	800	22.9
140	14.8	480	1.2	810	23.4
150	14.0	490	1.5	820	23.9
160	13.2	500	1.9	830	24.3
170	12.4	510	2.4	840	24.6
180	11.5	520	2.9	850	25.0
190	10.7	530	3.5	860	25.3
200	9.9	540	4.0	870	25.5
210	9.2	550	4.6	880	25.7
220	8.4	560	5.2	890	25.9
230	7.6	570	5.9	900	25.9
240	6.9	580	6.6	910	26.0
250	6.2	590	7.3	920	26.0
260	5.6	600	8.0	930	25.9
270	5.0	610	8.8	940	25.8
280	4.3	620	9.6	950	25.6
290	3.7	630	10.4	960	25.5
300	3.1	640	11.2	970	25.2
310	2.6	650	12.0	980	24.8
320	2.1	660	12.8	990	24.5
330	1.7	670	13.6	1000	24.1
340	1.4				

TABLE XV. Equation IX.

Argument IX.					
Arg. IX.	Equat. IX.	Arg. IX.	Equat. IX.	Arg. IX.	Equat. IX.
	Sec.		Sec.		Sec.
0	19.8	340	14.1	670	0.5
10	20.3	350	13.4	680	0.8
20	20.8	360	12.7	690	1.0
30	21.2	370	12.0	700	1.3
40	21.5	380	11.2	710	1.7
50	21.9	390	10.5	720	2.0
60	22.2	400	9.8	730	2.4
70	22.5	410	9.1	740	2.9
80	22.8	420	8.4	750	3.4
90	23.0	430	7.7	760	3.9
100	23.1	440	7.0	770	4.5
110	23.1	450	6.3	780	5.0
120	23.2	460	5.6	790	5.6
130	23.2	470	5.0	800	6.3
140	23.1	480	4.5	810	7.0
150	23.1	490	3.9	820	7.7
160	23.0	500	3.4	830	8.4
170	22.7	510	2.9	840	9.1
180	22.4	520	2.4	850	9.8
190	22.2	530	2.0	860	10.5
200	21.9	540	1.7	870	11.2
210	21.5	550	1.3	880	12.0
220	21.2	560	1.0	890	12.7
230	20.8	570	0.8	900	13.4
240	20.3	580	0.4	910	14.1
250	19.8	590	0.2	920	14.8
260	19.3	600	0.1	930	15.5
270	18.7	610	0.1	940	16.2
280	18.2	620	0.0	950	16.9
290	17.6	630	0.0	960	17.6
300	16.9	640	0.1	970	18.2
310	16.2	650	0.1	980	18.7
320	15.5	660	0.2	990	19.3
330	14.8	670	0.5	1000	19.8
340	14.1				

TABLE XVI. Equation X.

Argument X. = VII. – VIII.					
Arg. X.	Equat. X. Sec.	Arg. X.	Equat. X. Sec.	Arg. X.	Equat. X. Sec.
0	17.1	340	12.2	670	0.4
10	17.5	350	11.6	680	0.7
20	17.9	360	10.9	690	0.9
30	18.3	370	10.3	700	1.1
40	18.6	380	9.7	710	1.4
50	18.9	390	9.1	720	1.8
60	19.1	400	8.4	730	2.1
70	19.4	410	7.8	740	2.5
80	19.6	420	7.2	750	2.9
90	19.8	430	6.6	760	3.3
100	19.9	440	6.1	770	3.8
110	19.9	450	5.5	780	4.4
120	20.0	460	4.9	790	4.9
130	20.0	470	4.4	800	5.5
140	20.0	480	3.8	810	6.0
150	19.9	490	3.3	820	6.6
160	19.8	500	2.9	830	7.2
170	19.6	510	2.5	840	7.8
180	19.3	520	2.1	850	8.4
190	19.1	530	1.7	860	9.1
200	18.9	540	1.4	870	9.7
210	18.6	550	1.1	880	10.3
220	18.2	560	0.9	890	10.9
230	17.9	570	0.6	900	11.6
240	17.5	580	0.4	910	12.2
250	17.1	590	0.2	920	12.8
260	16.7	600	0.1	930	13.4
270	16.2	610	0.1	940	13.9
280	15.6	620	0.0	950	14.5
290	15.1	630	0.0	960	15.1
300	14.5	640	0.0	970	15.6
310	14.0	650	0.1	980	16.2
320	13.4	660	0.2	990	16.7
330	12.8	670	0.4	1000	17.1
340	12.2				

TABLE XVII. Equation XI.

Argument XI. = VII. + VIII.					
Arg. XI.	Equat. XI. Sec.	Arg. XI.	Equat. XI. Sec.	Arg. XI.	Equat. XI. Sec.
0	3.9	340	1.8	670	10.7
10	3.5	350	2.1	680	10.8
20	3.2	360	2.4	690	10.8
30	3.0	370	2.7	700	10.8
40	2.7	380	3.0	710	10.8
50	2.4	390	3.3	720	10.8
60	2.1	400	3.6	730	10.7
70	1.8	410	3.9	740	10.7
80	1.6	420	4.2	750	10.6
90	1.3	430	4.6	760	10.6
100	1.1	440	4.9	770	10.4
110	0.9	450	5.2	780	10.2
120	0.8	460	5.6	790	10.0
130	0.6	470	5.9	800	9.9
140	0.4	480	6.2	810	9.7
150	0.3	490	6.6	820	9.5
160	0.2	500	6.9	830	9.2
170	0.1	510	7.3	840	9.0
180	0.0	520	7.6	850	8.7
190	0.0	530	7.8	860	8.4
200	0.0	540	8.1	870	8.1
210	0.0	550	8.4	880	7.8
220	0.0	560	8.7	890	7.6
230	0.1	570	9.0	900	7.2
240	0.1	580	9.2	910	6.9
250	0.2	590	9.5	920	6.6
260	0.3	600	9.7	930	6.2
270	0.4	610	9.9	940	5.9
280	0.6	620	10.0	950	5.6
290	0.8	630	10.2	960	5.2
300	0.9	640	10.4	970	4.9
310	1.1	650	10.5	980	4.6
320	1.3	660	10.6	990	4.2
330	1.6	670	10.7	1000	3.9
340	1.8				

TABLE XVIII. Radius Vector of Jupiter's Orbit for 1750, with the Secular Variation.

Argument I. The mean Anomaly of Jupiter.

Degrees.	Sig. O.			Sig. I.			Sig. II.			Degrees.
	Rad. Vect.	Diff.	Secular Variation. + 0.000	Rad. Vect.	Diff.	Secular Variation. + 0.000	Rad. Vect.	Diff.	Secular Variation. + 0.000	
0	5.44648		69.64	5.41579		61.99	5.33011		39.86	30
1	5.44645	3	69.63	5.41375	204	61.49	5.32649	362	38.90	29
2	5.44634	11	69.61	5.41165	210	60.95	5.32283	366	37.93	28
3	5.44617	17	69.57	5.40949	216	60.41	5.31914	369	36.95	27
4	5.44593	24	69.51	5.40726	223	59.83	5.31540	374	35.96	26
5	5.44561	32	69.43	5.40498	228	59.25	5.31163	377	34.95	25
6	5.44523	38	69.34	5.40263	235	58.65	5.30782	381	33.93	24
7	5.44478	45	69.22	5.40023	240	58.05	5.30398	384	32.90	23
8	5.44426	52	69.09	5.39776	247	57.43	5.30010	388	31.85	22
9	5.44368	58	68.95	5.39524	252	56.78	5.29619	391	30.81	21
10	5.44302	66	68.79	5.39267	257	56.12	5.29225	394	29.75	20
11	5.44229	73	68.61	5.39003	264	55.44	5.28827	398	28.68	19
12	5.44150	79	68.40	5.38734	269	54.77	5.28427	400	27.60	18
13	5.44064	86	68.19	5.38459	275	54.06	5.28023	404	26.50	17
14	5.43971	93	67.98	5.38179	280	53.33	52.7617	406	25.40	16
15	5.43871	100	67.74	5.37893	286	52.60	52.7209	408	24.29	15
16	5.43764	107	67.45	5.37602	291	51.85	5.26797	412	23.17	14
17	5.43651	113	67.18	5.37306	296	51.09	5.26383	414	22.05	13
18	5.43531	120	66.87	5.37005	301	50.31	5.25967	416	20.92	12
19	5.43405	126	66.56	5.36698	307	49.52	5.25549	418	19.70	11
20	5.43271	134	66.23	5.36387	311	48.70	5.25128	421	18.60	10
21	5.43131	140	65.88	5.36070	317	47.88	5.24706	422	17.44	9
22	5.42985	146	65.52	5.35749	321	47.05	5.24282	424	16.27	8
23	5.42832	153	65.13	5.35422	327	46.20	5.23856	426	15.11	7
24	5.42672	160	64.74	5.35091	331	45.33	5.23428	428	13.92	6
25	5.42506	166	64.32	5.34756	335	44.45	5.22999	429	12.73	5
26	5.42333	173	63.88	5.34416	340	43.56	5.22569	430	11.54	4
27	5.42154	179	63.44	5.34071	345	42.65	5.22137	432	10.34	3
28	5.41969	185	62.98	5.33722	349	41.73	5.21704	433	9.14	2
29	5.41777	192	62.49	5.33368	354	40.79	5.21270	434	7.93	1
30	5.41579	198	61.99	5.33011	357	39.86	5.20836	434	6.72	0
	Sig. XI.		+	Sig. X.		+	Sig. IX.		+	

TABLE XVIII. Radius Vector of Jupiter's Orbit for 1750, with the Secular Variation.

Argument I. The mean Anomaly of Jupiter.

Degrees.	Sig. III.			Sig. IV.			Sig. V.			Degrees.
	Rad. Vect.	Diff.	Secular Variation. + 0.000	Rad. Vect.	Diff.	Secular Variation. — 0.000	Rad. Vect.	Diff.	Secular Variation. — 0.000	
0	5.20836	436	06.72	5.08063	394	29.78	4.98293	234	58.63	30
1	5.20400	436	05.49	5.07669	391	30.93	4.98059	227	59.33	29
2	5.19964	436	04.28	5.07278	387	32.07	4.97832	220	60.02	28
3	5.19528	437	03.06	5.06891	383	33.20	4.97612	212	60.67	27
4	5.19091	437	01.82	5.06508	380	34.32	4.97400	205	61.30	26
5	5.18654	437	00.61	5.06128	375	35.43	4.97195	198	61.92	25
6	5.18217	437	00.64	5.05753	371	36.53	4.96997	191	62.50	24
7	5.17780	437	01.87	5.05382	366	37.62	4.96806	182	63.07	23
8	5.17343	436	03.09	5.05016	363	38.70	4.96624	176	63.62	22
9	5.16907	436	04.34	5.04653	357	39.76	4.96448	167	64.14	21
10	5.16471	436	05.58	5.04296	353	40.82	4.96281	160	64.65	20
11	5.16035	434	06.82	5.03943	348	41.86	4.96121	152	65.14	19
12	5.15601	434	08.06	5.03595	343	42.89	4.95969	144	65.59	18
13	5.15167	433	09.29	5.03252	338	43.91	4.95825	136	66.02	17
14	5.14734	431	10.53	5.02914	333	44.89	4.95689	129	66.43	16
15	5.14303	431	11.75	5.02581	328	45.88	4.95560	120	66.82	15
16	5.13872	428	12.98	5.02253	322	46.85	4.95440	112	67.18	14
17	5.13444	428	14.22	5.01931	316	47.80	4.95328	104	67.51	13
18	5.13016	425	15.44	5.01615	311	48.75	4.95224	96	67.82	12
19	5.12591	424	16.66	5.01304	305	49.66	4.95128	88	68.11	11
20	5.12167	422	17.89	5.00999	299	50.56	4.95040	79	68.37	10
21	5.11745	419	19.11	5.00700	293	51.46	4.94961	71	68.61	9
22	5.11326	418	20.31	5.00407	287	52.33	4.94890	63	68.83	8
23	5.10908	415	21.52	5.00120	281	53.19	4.94827	54	69.02	7
24	5.10493	412	22.73	4.99839	274	54.02	4.94773	46	69.18	6
25	5.10081	409	23.91	4.99565	267	54.83	4.94727	38	69.32	5
26	5.09672	407	25.10	4.99298	262	55.63	4.94689	30	69.43	4
27	5.09265	404	26.28	4.99036	254	56.41	4.94659	21	69.51	3
28	5.08861	401	27.45	4.98782	248	57.17	4.94638	12	69.58	2
29	5.08460	397	28.62	4.98534	241	57.91	4.94626	4	69.62	1
30	5.08063		29.78	4.98293		58.63	4.94622		69.64	0
	Sig. VIII.		—	Sig. VII.		—	Sig. VI.		—	

TABLE XIX.

Equations of the Radius Vector, always additive.

Arg. II.	Equation II 00.0	Diff	Arg. II.
0	075		10000
100	078	3	9900
200	087	9	9800
300	101	14	9700
400	120	19	9600
500	145	25	9500
600	173	28	9400
700	205	32	9300
800	240	35	9200
900	277	37	9100
1000	316	39	9000
1100	355	39	8900
1200	393	38	8800
1300	430	37	8700
1400	466	36	8600
1500	499	33	8500
1600	529	30	8400
1700	556	27	8300
1800	579	23	8200
1900	598	19	8100
2000	612	14	8000
2100	622	10	7900
2200	627	5	7800
2300	628	1	7700
2400	624	4	7600
2500	617	7	7500
2600	605	12	7400
2700	589	16	7300
2800	569	20	7200
2900	547	22	7100
3000	521	26	7000
3100	493	28	6900
3200	463	30	6800
3300	431	32	6700
3400	397	34	6600
3500	362	35	6500
3600	327	35	6400
3700	292	35	6300
3800	256	36	6200
3900	221	35	6100
4000	188	33	6000
4100	156	32	5900
4200	126	30	5800
4300	098	28	5700
4400	073	25	5600
4500	052	21	5500
4600	034	18	5400
4700	020	14	5300
4800	009	11	5200
4900	002	7	5100
5000	000	2	5000

TABLE XX.

Equations of the Radius Vector, always additive.

Arg. IV.	Equation IV. 0.00	Diff	Arg. IV.	Equation IV. 0.00	Diff.
0	049		5000	136	
100	044	5	5100	141	5
200	039	5	5200	146	5
300	035	4	5300	151	5
400	030	5	5400	155	4
500	026	4	5500	159	4
600	022	4	5600	163	4
700	018	4	5700	167	4
800	015	3	5800	170	3
900	012	3	5900	173	3
1000	009	3	6000	176	3
1100	007	2	6100	178	2
1200	005	2	6200	180	2
1300	003	2	6300	182	2
1400	002	1	6400	183	1
1500	001	1	6500	184	1
1600	000	0	6600	185	1
1700	000	0	6700	185	0
1800	000	0	6800	185	0
1900	001	1	6900	185	0
2000	002	1	7000	184	1
2100	003	1	7100	183	1
2200	004	1	7200	181	2
2300	006	2	7300	179	2
2400	008	2	7400	177	2
2500	011	3	7500	175	2
2600	014	3	7600	172	3
2700	017	3	7700	168	4
2800	020	3	7800	165	3
2900	024	4	7900	161	4
3000	028	4	8000	157	4
3100	033	5	8100	153	4
3200	037	4	8200	148	5
3300	042	5	8300	143	5
3400	047	5	8400	138	5
3500	052	5	8500	133	5
3600	057	5	8600	128	5
3700	063	6	8700	123	5
3800	068	5	8800	117	6
3900	074	6	8900	111	6
4000	080	6	9000	106	5
4100	086	6	9100	100	6
4200	091	5	9200	094	6
4300	097	6	9300	088	6
4400	103	6	9400	082	6
4500	109	6	9500	077	5
4600	115	6	9600	071	6
4700	120	5	9700	065	6
4800	126	6	9800	060	5
4900	131	5	9900	054	6
5000	136	5	10000	049	5

TABLE XXI.

Equations of the Radius Vector, always additive.

Arg. V.	Equation V.		Arg. V.	Equation V.		Arg. V.	Equation V.		Arg. V.	Equation V.	
	0.00	Diff.		0.00	Diff.		0.00	Diff.		0.00	Diff.
0	087		2500	381		5000	334		7500	040	
100	098	11	2600	388	7	5100	323	11	7600	033	7
200	109	11	2700	395	7	5200	312	11	7700	026	7
		12			6			12			6
300	121		2800	401		5300	300		7800	020	
400	134	13	2900	406	5	5400	288	12	7900	015	5
500	146	12	3000	411	5	5500	275	13	8000	010	5
		13			4			13			4
600	159		3100	415		5600	262		8100	006	
700	172	13	3200	417	2	5700	249	13	8200	004	2
800	185	13	3300	419	2	5800	236	13	8300	002	2
		13			2			13			2
900	198		3400	421		5900	223		8400	000	
1000	211	13	3500	421	0	6000	210	13	8500	000	0
1100	224	13	3600	420	1	6100	197	13	8600	001	1
		13			1			13			1
1200	237		3700	419		6200	184		8700	002	
1300	250	13	3800	417	2	6300	171	13	8800	004	2
1400	263	13	3900	414	3	6400	158	13	8900	007	3
		13			3			13			3
1500	276		4000	411		6500	145		9000	010	
1600	288	12	4100	406	5	6600	132	13	9100	015	5
1700	301	13	4200	401	5	6700	120	12	9200	020	5
		11			6			11			6
1800	312		3300	395		6800	109		9300	026	
1900	324	12	4400	388	7	6900	097	12	9400	033	7
2000	335	11	4500	380	8	7000	086	11	9500	041	8
2100	345	10	4600	372	8	7100	076	10	9600	049	8
		10			8			10			8
2200	355		4700	364		7200	066		9700	057	
2300	364	9	4800	354	10	7300	057	9	9800	067	10
2400	373	9	4900	344	10	7400	048	9	9900	077	10
2500	381	8	5000	334	10	7500	040	8	10000	087	10

TABLE XXII. Heliocentric Latitude for 1750, with the Secular Variation.

Argument XII. Longitude of Jupiter — that of the Node.

Degrees.	Latitude. Sig. O. *N.* Sig. VI. *S.*			Differ.		Sec. Var. — —	Latitude. Sig. I. *N.* Sig. VII. *S.*			Differ.		Sec. Var. — —	Latitude. Sig. II. *N.* Sig. VIII. *S.*			Differ.	Sec. Var. — —	Degrees.
	D	M.	S.	M.	S.	Sec.	D.	M.	S.	M.	S.	Sec.	D.	M.	S.	Sec.	Sec.	
0	0	0	0	1	23	0.0	0	39	31	1	11	11.0	1	8	27	40	19.0	30
1	0	1	23	1	22	0.4	0	40	42	1	11	11.4	1	9	7	40	19.2	29
2	0	2	45	1	23	0.8	0	41	53	1	10	11.7	1	9	47	38	19.4	28
3	0	4	8	1	23	1.1	0	43	3	1	9	12.0	1	10	25	37	19.6	27
4	0	5	31	1	22	1.5	0	44	12	1	8	12.3	1	11	2	36	19.8	26
5	0	6	53	1	23	1.9	0	45	20	1	7	12.6	1	11	38	34	20.0	25
6	0	8	16	1	22	2.3	0	46	27	1	7	12.9	1	12	12	33	20.1	24
7	0	9	38	1	22	2.7	0	47	34	1	5	13.2	1	12	45	32	20.3	23
8	0	11	0	1	22	3.1	0	48	39	1	5	13.5	1	13	17	30	20.4	22
9	0	12	22	1	21	3.4	0	49	44	1	4	13.8	1	13	47	29	20.5	21
10	0	13	43	1	22	3.8	0	50	48	1	3	14.1	1	14	16	28	20.7	20
11	0	15	5	1	21	4.2	0	51	51	1	2	14.4	1	14	44	26	20.8	19
12	0	16	26	1	21	4.6	0	52	53	1	1	14.7	1	15	10	25	20.9	18
13	0	17	47	1	20	5.0	0	53	54	1	0	15.0	1	15	35	23	21.1	17
14	0	19	7	1	20	5.4	0	54	54	0	59	15.3	1	15	58	22	21.2	16
15	0	20	27	1	20	5.7	0	55	53	0	58	15.5	1	16	20	21	21.3	15
16	0	21	47	1	19	6.1	0	56	51	0	57	15.8	1	16	41	19	21.4	14
17	0	23	6	1	19	6.5	0	57	48	0	56	16.1	1	17	0	18	21.5	13
18	0	24	25	1	19	6.8	0	58	44	0	55	16.3	1	17	18	17	21.5	12
12	0	25	44	1	18	7.2	0	59	39	0	54	16.6	1	17	35	15	21.6	11
20	0	27	2	1	17	7.6	1	0	33	0	52	16.9	1	17	50	14	21.6	10
21	0	28	19	1	17	7.9	1	1	25	0	52	17.1	1	18	4	12	21.7	9
22	0	29	36	1	17	8.3	1	2	17	0	50	17.4	1	18	16	11	21.8	8
23	0	30	53	1	16	8.7	1	3	7	0	49	17.6	1	18	27	9	21.8	7
24	0	32	9	1	15	9.0	1	3	56	0	48	17.8	1	18	36	8	21.9	6
25	0	33	24	1	15	9.4	1	4	44	0	47	18.1	1	18	44	7	21.9	5
26	0	34	39	1	14	9.7	1	5	31	0	45	18.3	1	18	51	5	22.0	4
27	0	35	53	1	13	10.0	1	6	16	0	45	18.5	1	18	56	3	22.0	3
28	0	37	6	1	13	10.4	1	7	1	0	44	18.7	1	18	59	2	22.0	2
29	0	38	19	1	12	10.7	1	7	45	0	42	18.9	1	19	1	1	22.0	1
30	0	39	31			11.0	1	8	27			19.0	1	19	2		22.0	0
	Sig. XI. *S.*					—	Sig. X. *S.*					—	Sig. IX. *S.*				—	
	Sig. V. *N.*						Sig. IV. *N.*					—	Sig. III. *N.*				—	

For any time before 1750, the Secular Variation changes the Sign.

TABLE XXIII. Reduction to the Ecliptic, and the Logarithm of the Coſine of the Heliocentric Latitude.

Argument XII.							
Degrees.	Reduction to Ecliptic. Sig. O. — Sig. VI. — Sec.	Log. coſin. Lat. helioc.	Reduction to Ecliptic. Sig. I. — Sig. VII. — Sec.	Log. coſin. Lat. helioc.	Reduction to Ecliptic. Sig. II. — Sig. VIII. — Sec.	Log. coſin. Lat. helioc.	Degrees.
0	0.0	0.000000	23.6	9.999971	23.6	9.999914	30
1	0.9	0.000000	24.0	9.999970	23.1	9.999912	29
2	1.9	0.000000	24.5	9.999968	22.6	9.999910	28
3	2.8	0.000000	24.9	9.999966	22.1	9.999909	27
4	3.8	9.999999	25.3	9.999964	21.5	9.999907	26
5	4.7	9.999999	25.6	9.999962	20.9	9.999906	25
6	5.7	9.999999	25.9	9.999960	20.3	9.999904	24
7	6.6	9.999998	26.2	9.999958	19.6	9.999903	23
8	7.5	9.999998	26.4	9.999957	19.0	9.999901	22
9	8.4	9.999997	26.7	9.999955	18.2	9.999900	21
10	9.3	9.999997	26.8	9.999953	17.5	9.999899	20
11	10.2	9.999996	27.0	9.999951	16.8	9.999897	19
12	11.1	9.999995	27.1	9.999949	16.0	9.999896	18
13	12.0	9.999994	27.2	9.999947	15.2	9.999895	17
14	12.8	9.999993	27.2	9.999945	14.4	9.999895	16
15	13.6	9.999992	27.2	9.999943	13.6	9.999893	15
16	14.4	9.999991	27.2	9.999941	12.8	9.999892	14
17	15.2	9.999990	27.2	9.999939	12.0	9.999891	13
18	16.0	9.999989	27.1	9.999937	11.1	9.999890	12
19	16.8	9.999988	27.0	9.999935	10.2	9.999889	11
20	17.5	9.999987	26.8	9.999933	9.3	9.999889	10
21	18.2	9.999985	26.7	9.999931	8.4	9.999888	9
22	19.0	9.999984	26.4	9.999929	7.5	9.999887	8
23	19.6	9.999982	26.2	9.999927	6.6	9.999887	7
24	20.3	9.999981	25.9	9.999925	5.7	9.999887	6
25	20.9	9.999980	25.6	9.999923	4.7	9.999886	5
26	21.5	9.999978	25.3	9.999921	3.8	9.999886	4
27	22.1	9.999976	24.9	9.999919	2.8	9.999886	3
28	22.6	9.999974	24.5	2.999917	1.9	9.999885	2
29	23.1	9.999973	24.0	9.992916	0.9	9.999885	1
30	23.6	9.999971	23.6	9.999914	0.0	9.999885	0
	Sig. XI. +		Sig. X. +		Sig. IX. +		
	Sig. V. +		Sig. IV. +		Sig. III. +		

Explanation of the Tables of Jupiter.

The firſt Table contains the epochs of the mean longitude of the aphelion and node of Jupiter; together with the Arguments of the equations expreſſed by dividing the circle into 10,000 equal parts for Arguments II, III, IV, V; and into 1000 equal parts for Arguments VI, VII, VIII, IX. Table II. contains the mean motions of the ſame for years. Table III. contains the mean motions for months; that is, for the beginning of each month reckoned from the beginning of the year. Table IV. contains the mean motions for days. Table V. contains the mean motions for hours and minutes. Table VI. contains the great equation of Jupiter for every 10 years. Table VII. contains the equation of Jupiter's orbit for the year 1750, with the ſecular variation. Table VIII. contains the equation of the orbit correſponding to Argument II. Table IX. contains the equation anſwering to Argument III. Table X. contains the equation anſwering to Argument IV. Table XI. contains the equation anſwering to Argument V. Table XII. contains the equation anſwering to Argument VI. Table XIII. contains the equation anſwering to Argument VII. Table XIV. contains the equation anſwering to Argument VIII. Table XV. contains the equation anſwering to Argument IX. Table XVI. contains the equation anſwering to Argument VII. — Argument VIII. Table XVII. contains the equation anſwering to Argument VII. + Argument VIII. Table XVIII. contains the radius vector of the orbit of Jupiter for 1750, with the ſecular variation; the mean diſtance of the earth from the ſun being unity. Table XIX. contains the equation of the radius vector anſwering to Argument II. Table XX. contains the equation anſwering to Argument IV. Table XXI. contains the equation anſwering to Argument V. Table XXII. contains the heliocentric latitude of Jupiter for the year 1750, with the ſecular variation. Table XXIII. contains the reduction to the ecliptic; with the log. coſine of the heliocentric latitude.

All the above mentioned equations of the motion of Jupiter, the equations of the orbit excepted, ariſe from the attraction of Saturn, and depend upon the relative ſituation of Jupiter and Saturn. The theory of theſe equations was given by M. de la Place in the Memoirs of 1786, from the theory of gravity, and they were computed by M. de Lambre.

Let a expreſs the number of years from 1750, S the mean longitude of Saturn, I the mean longitude of Jupiter: then the great equation of Jupiter is,

$$-(20' \, 49''.5 - a \times 0''.042733) \times \text{ſin.}\,(5S - 2I + 5^{\circ}\, 34'\, 8'' - a \times 58''.88).$$

The great equation of Saturn ariſing from the attraction of Jupiter, is alſo found to be (Mem. 1785),

$$-(48'\, 44'' - a \times 0''.1) \times \text{ſin.}\,(5S - 2I + 5^{\circ}\, 34'\, 8'' - a \times 58''.88).$$

The period of theſe two equations is 918.76 years. By way of diſtinction, theſe are called the *great* equations of Jupiter and Saturn: theſe two equations of Jupiter and Saturn are very nearly in the ratio of 3 to 7. Now it is manifeſt, that when $5S - 2I - a \times 58''.88 = 360^{\circ}$, the equation muſt then begin again, and therefore this will determine the period; now $5S - 2I - a \times 58''.88$ increaſes $1410''.6$ in a common year; therefore $\frac{360 = 1296000}{1410.6} = 918.76$ years, the period in which theſe equations return again the ſame.

Theſe equations ſhew the reaſon, why the preſent mean motions of Jupiter and Saturn differ from the true mean motions, as the latter cannot be determined but by taking in the above period. We have the apparent mean motion of Saturn, in a common year, by adding to its mean annual motion, the quantity by which the great equation varies in that time, and this quantity is very nearly $= -(48'\, 44'' - a \times 0''.1) \times \text{ſin.}\, 23'\, 31'' \times \text{coſ.}\,(5S - 2I + 5^{\circ}\, 34'\, 8'' - a \times 58''.88)$; and the apparent mean motion of Jupiter is this quantity with a contrary ſign, diminiſhed in the ratio of 7 to 3, and added to his mean annual motion.

Now the fluxion of the coſine of any quantity = ſine × flux. arc, therefore when coſ. = a maximum, ſine × flux. arc = 0, or the ſine of the arc = 0, or the arc = 0; therefore when the above quantity = a maximum, $5S - 2I + 5^{\circ}\, 34'\, 8'' - a \times 58''.88 = 0$, which happened in the year 1560. At that time, the apparent annual motion of Saturn was leſs than the true, by 20″.1, and that of Jupiter greater by 8″.6; ſince that time their apparent mean motions have been approaching to their true mean motions, and in 1789 their apparent and true mean motions were equal. Theſe reſults ſhew, why, in comparing the modern with the ancient obſervations, the mean motion of Saturn appears to be retarded, and that of Jupiter accelerated; and that from a compariſon of the modern obſervations, the mean motion of Saturn appears to be accelerated, and that of Jupiter to be retarded.

Now if H be the heliocentric mean longitude of Jupiter; h that of Saturn, corrected by the above equations reſpectively, computed from the equinox of the year 1750; the other equations of the motion of Jupiter from the action of Saturn, are,

$$\begin{array}{l}
- 1'\, 22''.7\ \text{ſin.}\,(H - h) + 3'\, 24''.3\ \text{ſin.}\, 2\,(H - h) + 17''\\
\quad \text{ſin.}\, 3\,(H - h) + 3''.9\ \text{ſin.}\, 4\,(H - h)\\
+ 2'\, 18''.4\ \text{ſin.}\,(H - 2h - 13^{\circ}\, 33'\, 7'' + a \times 13''.7)\\
+ 1\ 27.4\ \text{ſin.}\,(2H - 3h - 61\ 59\ 48 + a \times 21.9)\\
+ 2\ 47.0\ \text{ſin.}\,(3H - 5h + 55\ 19\ 21 + a \times 43.0)\\
- \quad 16.0\ \text{ſin.}\,(3H - 4h - 62\ 51\ 19)\\
+ \quad 12.8\ \text{ſin.}\,(3H - 2h - 8\ 30\ 15)\\
- \quad 13.0\ \text{ſin.}\,(3h - H - 58\ 31\ 0)\\
+ \quad 11.6\ \text{ſin.}\,(h + 45\ 4')\\
+ \quad 10.0\ \text{ſin.}\,(4H - 5h + 45\ 16\ 32)\\
- \quad 5.4\ \text{ſin.}\,(2H - h + 16\ 1\ 27)
\end{array}$$

Now the ſum of the maxima of all theſe equations, is 11′ 56″.3; and in the Tables computed for theſe equations, each equation is increaſed by its maximum, in order to render all the equations additive; this quantity, therefore, muſt always be ſubtracted from the ſum of the equations taken from the Tables.

To find the heliocentric Latitude and Longitude of Jupiter.

From Table I. of the epochs, take out the epochs of the mean longitude of the aphelion and node, with the Arguments II, III, IV, V, VI, VII, VIII, IX, and place them in an horizontal line. But if the given year be not found in that Table, take the neareſt year preceding the given year as an epoch, and take out as before; under which, from Table II, place the mean motion in longitude, of the aphelion and node, with the Arguments, anſwering to the number of years elapſed ſince the epoch to the given year.

Under theſe, write down (Table III.) the mean motions of the ſame, for the given month.

Under theſe, write down (Table IV.) the mean motions of the ſame, for the given day of the month.

Under theſe, write down (Table V.) the mean motions of the ſame, for the given hours and minutes. The arguments for hours and minutes are ſo ſmall that they are here omitted:

omitted ; the mean motions for ſeconds are alſo omitted for the ſame reaſon. In our computations, therefore, we take to the neareſt minute.

Under theſe, write down the great inequality (Table VI.) in the firſt column, with the correſponding arguments.

Add together the numbers in the ſeveral columns, rejecting 12 *S*, or any multiple thereof, if they occur ; and in the arguments, rejecting 10,000 for Arguments II, III, IV, V, and 1000 for Arguments VI, VII, VIII, IX, or any multiples thereof, and you get, for the given time, the mean longitude corrected for the great equation, the aphelion, the node, and the arguments corrected for the great equation.

From the longitude corrected for the great equation, as already found, ſubtract the longitude of the aphelion, and you have Arg. I. Arg. VII. — Arg. VIII. gives Arg. X. ; Arg. VI. + Arg. VIII. gives Arg. XI.

With Argument I. making proportion for the minutes and ſeconds, take out the equation of Jupiter's orbit in Table VII., together with the ſecular variation, with their proper ſigns, except the time be *before* 1750, in which caſe, the ſecular variation is to be taken out with a contrary ſign ; then ſay, 100 : the years from 1750 to the given time : : the ſecular variation above found : the ſecular variation required. With Argument II. take out the equation in Table VIII, making proportion in this, and in the following equations, for the intermediate numbers of the arguments. With Argument III. take out the equation in Table IX. With Argument IV. take out the equation in Table X. With Argument V. take out the equation in Table XI. With Argument VI. take out the equation in Table XII. With Argument VII. take out the equation in Table XIII. With Argument VIII. take out the equation in Table XIV. With Argument. IX. take out the equation in Table XV. With Argument X. take out the equation in Table XVI. With Argument XI. take out the equation in Table XVII. Take the ſum of all theſe equations (regard being had to the ſigns of the firſt equation and the ſecular variation, the ſigns of the others being all poſitive), and from it ſubtract 11′ 56″.3, and you have the value of theſe eleven equations ; and this applied, with its proper ſign, to the longitude already found as corrected by the great equation, gives the longitude of Jupiter in his orbit.

From the longitude thus found, ſubtract the longitude of the node, and you get Argument XII.

With Argument XII. enter Table XXIII. and take out the reduction to the ecliptic with its proper ſign, making proportion for the minutes and ſeconds of the argument ; and this applied to the longitude of Jupiter in his orbit, gives his true heliocentric longitude on the ecliptic, reckoned from the mean equinox.

With the Argument XII. enter Table XXII. ; take out the latitude with its ſecular variation, making proportion for the minutes and ſeconds of the argument ; and apply the ſecular variation, according to its ſign, to the latitude, and you have the true heliocentric latitude of Jupiter.

With the mean anomaly of Jupiter, enter Table XVIII. and take out the radius vector, and correct it by the following Tables, and you have the true diſtance of Jupiter from the ſun ; the earth's diſtance being unity.

Example.—*To find the true heliocentric Latitude and Longitude of Jupiter, on July* 11, 1780, *at* 5ʰ 49′ *mean Time at Greenwich.*

	Longitude.	Aphelion.	Node.
	s ° ′ ″	s ° ′ ″	s ° ′ ″
Epoch for 1780	6 14 38 16.6	6 10 49 26	3 8 12 13
July - -	15 2 47.0	28	18
11ᵈ -	54 51.9	2	1
5ʰ - -	1 2.3		
49′ -	10.0		
Great equation -	20 46.1		
Sum - -	7 0 57 53.9	6 10 49 56	3 8 12 32
Sum of 11 equats.	— 1 48 57.8	7 0 57 54	6 29 8 56
Long. in orbit -	6 29 8 56.1	0 20 7 58	3 20 56 24
Red. to ecl. -	+ 18.2	Arg. I.	Arg. XII.
Helioc. long. -	6 29 9 14.3		

Arguments.

II.	III	IV.	V.	VI.	VII.	VIII.	IX.
8783	2177	0959	3140	974	296	444	661
250	81	331	412	58	91	9	17
15	5	20	25	4	6	1	1
32	55	87	141	12	7	— 8	— 2
9080	2318	1397	3718	48	400	446	677
					446	48	

Arg X. 954 | 494 Arg XI

Latitude heliocentric (by Arg. XII.) 1° 13′ 49″ N.
Secular variation - - — 6

True heliocentric latitude - 1 13 43 N.

	° ′ ″
Arg. I. - -	— 1 47 40.0
Secular variation -	— 5.2
Maxima of the next equations	— 11 56.3
Sum of the negative parts	— 1 59 41.5
Arg. II. - -	+ 0 1 33 6
Arg. III. - -	4 28.4
Arg. IV. - - -	1 9.7
Arg. V. - - -	2 20.3
Arg. VI. - -	27.4
Arg. VII. - - -	21.8
Arg. VIII. - -	0.3
Arg. IX. - - -	0.7
Arg. X. - - -	14.8
Arg. XI. - - -	0.7
Sum of the poſitive parts	+ 0 10 43.7
Value of 11 equations -	— 1 48 57.8

Argument I. and the ſecular variation being negative, they are added to 11′ 56″.3 to get the negative parts; but if the two firſt taken together had been poſitive, they would have been put above Argument II. amongſt the poſitive equations, and then all the poſitive equations might have been added up, and 11′ 56″.3 ſubtracted from the ſum.

This is the true heliocentric longitude on the ecliptic, from the *mean* equinox; and if we want it from the *true* equinox, we muſt apply to it the equation of the equinoxes.

In this operation, the firſt five lines are taken out immediately from the Tables. The great equation is thus found: for the beginning of 1780 it is 20′ 46″, as found immediately in the Table. The great equation for a very diſtant period is thus found: the variation is expreſſed by $-a \times 0''.042733 \times$ ſin. $(5S - 2I + 5^\circ.\,34'\,8'' - a \times 58''.88)$; if we take $a = 459.38$, which is half a period, $a \times 0''.042733 = 19.''6$, which is additive *before* 1750; this then is the greateſt variation of the equation, taking $5S - 2I + 5^\circ\,34'\,8' - a \times 58''.88 = 90^\circ$, ſo that its ſine may $= 1$, a maximum; that is, it is the variation anſwering to the preſent greateſt equation 20′ 49′.5, for this is the greateſt equation when $a = 0$, or for 1750, and therefore will be very nearly ſo for the preſent time. Now ſuppoſe we wanted to know the equation for May 16, in the year 133, or in the year 133.37; then we multiply a half period by ſuch a number, that the product added to 133 may produce ſome year in our Table VI., and then we find the equation for that year; multiply therefore 459.38 by 4, and add it to 133, and it gives 1970, correſponding to which, the equation is 6′ 40″.2; now the variation of the greateſt equation is 19″.6 for half a period, and therefore it is $4 \times 19'.6 =$

78″.4 for 4 half periods; hence, the greateſt equation 20′ 49′.5 : 6′ 40″.2 :: 78″.4 : 26″, which (as the time is *before* 1750) added to 6′ 40″.2, gives 7′ 6″.2, the equation for May 16, 133. This, however, is only an approximation. We calculate for half periods, becauſe then all the arguments return again the ſame. Now from that time to the given time, that is, July 11, 5^h, the interval is 0.53 of a year; and for 10 years, the increaſe of the equation is 1″.7; hence, 10 : 0.53 :: 1″.7 : 0″.09, the variation in 0.53 of a year; which added to 20′ 46′, gives 20′ 46″.09, or 20′ 46″.1, taking it to the neareſt tenth of a ſecond, the great equation. The arguments of the great equation are taken from the year 1780, they not having ſenſibly altered from that time to the given time. The ſums of all the columns give the longitude corrected by the great equation, the aphelion, the node, and the arguments, for the given time. The Arguments I, X, XI, are immediately found according to the rule. The equation to Argument I. is thus found: the Argument is 20° 7′ 58″. Now in Table VII. the equation anſwering to 20° is — 1° 46′ 59″, and the variation for 60′ is 5′ 9′; hence, 60′ : 7′ 58″ :: 5′ 9″ : 41″, which (as the equation is increaſing) added to — 1 46′ 59″, gives — 1° 7′ 40′, the equation required. And to find the ſecular variation, that variation is — 16″.98 for 20°, and it changes 0″.82 for 60′; hence, 60′ : 7′ 58″ :: 0″.82 : 0″.11, which (as the variation increaſes) added to — 16″.98, gives — 17″.09, the ſecular variation correſponding to the given argument. Now this ſecular variation is reckoned from 1750, and from thence to July 11, 1780, there has elapſed 30.53 years; hence, 100 : 30.53 :: — 17″.09 : — 5″.2, the ſecular variation for 30.53 years. With 9080 take the equation from Table VIII. Now the equation is 1′ 30″.6 for the Argument 9000, and it changes 3″.7 for 100; hence, 100 : 80 :: 3″.7 : 3″, which (as the equation is increaſing) added to 1′ 30″.6, gives 1′ 33″.6, the equation required. By proceeding thus to Argument XI. we get all theſe equations. And by taking the difference of the poſitive and negative parts, we obtain 1° 48′ 57″.8, the value of theſe 11 equations, which applied, with the proper ſign, to 7^s 0° 57′ 53″.9, gives 6^s 29° 8′ 56′.1, the longitude of Jupiter in his orbit. Now for the reduction of this to the ecliptic, we have Argument XII. = 3^s 20° 56′ 24″; and the reduction in Table XXIV. is + 17″.5 for 3^s 20°; and it changes 0″.7 for 60′; hence, 60′ : 56′ 24″ :: 0″.7 : 0″.7, taking it to the neareſt tenth of a ſecond; and this (as the reduction increaſes) added to + 17′.5, gives + 18″.2, the reduction, which applied to 6^s 29 8′ 56″.1, gives 6^s 29° 9′ 14′ 3, the true heliocentric longitude of Jupiter in his orbit, from the mean equinox. With Argument XII. enter Table XXIII. and the latitude for 3^s 20° is 1° 46′ 16″ N., and the variation is 29″ for 60′; hence, 60′ : 56′ 24″ :: 29″ : 27″, which (as the equation is diminiſhing) ſubtracted from 1° 46′ 16′ N., gives 1° 13′ 49″ N., the latitude uncorrected for the ſecular variation. Now for 3^s 20° 56′ 24″, the ſecular variation is — 20″.5, as we may take it the ſame as for 3^s 21°; and the time from 1750 being 30.53 years, we have, 100 : 30.53 :: — 20″.5 : — 6″, the ſecular variation for 30.53 years, and thus applied to 1° 13′ 49″ N., gives 1° 13′ 43″ N., the true heliocentric latitude of Jupiter.

Given the heliocentric latitude and longitude of Jupiter; to find the geocentric latitude and longitude, and his diſtance from the ſun and earth.

Example.—*To find the geocentric latitude and longitude of Jupiter, and his diſtance from the earth, on July* 11, 1780, *at* 5^h 49′ *mean time.*

	s	°	′	″	
Hel. long. Jupiter	6	29	9	14.3	
Longitude earth	9	19	52	28.3	
Commut.	2	20	43	14.0	
Sup. ($SvE + SEv$)	3	9	16	46	
Half. Sup.	1	19	38	23	
	1	8	52	16	
Elongation	2	28	30	39	
Long. ſun + 20″	3	19	52	28.3	
Geo. long.	6	18	23	7.3	
Ar. co. l. ſin. 99° 16′ 46″					0.00573
ſin. 18 30 39					9.99985
Tan. hel. lat. 1 13 43					8.33126
Tan. *geo. lat.* 1 14 39					8.33684
Arg. I.					5.43252
Secular variation					20
Arg. II.					285
IV.					2
V.					419
Radius vector					5.43978
Log. rad. vec.					0.7355813
Log. coſ. hel. lat.					9.9999001
Log. Sv					0.7354814
Log Sv + 10					10.7354814
Log. SE					0.0071010
Tan. 79° 24′ 48″ (d°)					10.7283804
45					
Tan. 34 24 48					9.8357262
Tan. 49 38 23					10.0706464
Tan. 38 52 16					9.9063726
Log. Sv					0.7354814
Log. ſin. 80° 44′ 14″					9.9942791
Ar. co. l. ſin. 88 30 39					0.0001467
Ar. co. l. coſ. 1 14 39					0.0001924
Log. $EP = 5.3715$					0.7300996

Jupiter, among *Alchemiſts*, ſignifies the philoſophers' gold. The gentlemen of this profeſſion apply every thing to their art, which the mythologiſts mention of the god Jupiter, pretending that the ancient fables are to be underſtood in a figurative ſenſe: for inſtance, Jupiter is the maſter of the gods; and gold, ſay they, is the moſt precious of metals. Mercury is the ambaſſador of Jupiter; and this ſhews with how much eaſe Mercury inſinuates into every thing. Jupiter holds the thunderbolt as his ſceptre; which evidently points out the external ſulphur uſed in projection. Jupiter has the heavens for his ordinary habitation; this ſhews him volatile, dry, and hot. The debauches of Jupiter, who ſought for pleaſure in the low, but prolific and fruitful earth, diſcover, ſay they, its fecundity, and that gold might be made, were but the way of preparing it diſcovered. In a word, Jupiter is the ſon of Saturn, which ſhews ſome reſemblance between the qualities of gold and lead.

Jupiter, in *Chemiſtry*, denotes tin.

Jupiter's *Beard, Barba Jovis*, in *Botany*, the name given to a ſpecies of anthyllis.

Jupiter's *Beard, American*, is a ſpecies of Amorpha.

Jupiter's *Diſtaff*, is a ſpecies of Salvia or ſage.

Jupiter *Fulminans* and *Fulgurator*. See Fulminant.

Jupiter, *Flamen of*. See Flamen.

JUPUBA, in *Ornithology*. See Oriolus *Hæmorrhous*.

JUPUJUBA, the Braſilian name of a bird of the woodpecker kind, more commonly known by the name Japu. See Oriolus *Perſicus*.

JUQUER, in *Botany*. This plant is found in Braſil, and is of a poiſonous nature; but if we may credit Piſo, its root is its antidote.

JURA, in *Geography*, one of the eleven departments of the eaſtern region of France, compoſed of the bailliages of Dole and Aval, in 46° 40′ N. lat., between Saône and Switzerland. It is bounded on the N. by the department of the Upper Saône, on the E. by the department of the Doubs, and the canton of Berne in Switzerland, on the S. by the department of the Aiſne, and on the W. by the departments of the Saône and Loire, and Côte d'Or. The capital is Lons le Saulnier. This department contains 5278½ kiliometres, or about 256 ſquare leagues, in four diſtricts, 32 cantons, and 728 communes; and 289,865 inhabitants. The diſtricts or circles are Dôle, including 63,581 inhabitants; Poligny, 69,378; Lons-le-Saulnier, 107,478; and St. Claude, 49,428. Its contributions amount to 2,005,226 francs, and its expences to 225,873 fr. 58 cents. The plains in this department produce grain, wine, fruits, and paſtures; the hills yield little grain, but abound in paſtures and extenſive foreſts. It has mines of copper, lead, iron, ſalt, coal, with quarries of marble, ſtone, &c.

Jura, one of the Hebrides, or weſtern iſlands of Scotland, is ſituated oppoſite to the diſtrict of Knapdale, in Argyleſhire, to which county it is politically annexed. Its extent is upwards of thirty miles in length, and, on an average, ſeven in breadth. Of all the weſtern iſles, Jura is the moſt rugged, being chiefly compoſed of mountains of vaſt rocks, apparently piled on each other in the utmoſt diſorder, without a poſſibility of cultivation. The four principal of theſe mountains are termed the Paps-of-Jura; which form a ridge from ſouth to north, nearly through the middle of the iſland. Theſe are conſpicuous at a great diſtance, and terminate the weſtern proſpect from the continent; from their ſituation and height, they are frequently enveloped in clouds and darkneſs. Of theſe four, the ſouthern is called Beinn-Achaolais, "the mountain of the ſound," from its proximity to the ſound of Iſla; the next, which is the higheſt, Beinn-an-oir, "the mountain of gold;" the third, Beinn-ſheunta, "the conſecrated mountain;" and the northern Corra-bhien, "the ſteep mountain." Pennant reports that he aſcended Beinn-an-oir with great difficulty, and deſcribes it as being compoſed of large ſtones, covered with moſſes near the baſe; but all above were bare and unconnected with each other. "The whole," he ſays, "ſeems a *cairn*, the work of the ſons of Saturn." The grandeur of the proſpect from the ſummit, however, compenſated him for the fatigue of the aſcent. Jura itſelf afforded a ſtupendous ſcene of rock, varied with innumerable ſmall lakes, and calculated to raiſe ſublime emotions in the mind of the ſpectator. From the weſt ſide of the hill ran a narrow ſtrip of rock, called *the ſlide of the old hag*, and terminating in the ſea. To the ſouth appeared Ilay, extended like a map; and beyond it, the north of Ireland; to the weſt, Gigha and Cara, Cantyre and Arran, and the Firth of Clyde, bounded by Ayrſhire; an amazing tract of mountains to the north-eaſt, as far as Ben-lomond; Skarba finiſhed the northern view; and over the weſtern ocean were ſcattered Colonſay and Oranſay, Mull, Iona, and the neighbouring group of iſlands; and ſtill further, the long extents of Tirey and Col juſt apparent. Sir Joſeph Banks and his friends, in their journey to Scotland, aſcended Beinn-ſheunta, and found it to be 2359 feet above the level of the ſea; but Beinn-an-oir exceeds that in height by 61 feet. The weſt ſide of the iſland is not fit for cultivation, being ſo wild and rugged, and ſo interſected by torrents ruſhing from the mountains, that no perſon chooſes to make his abode in it. All the inhabitants, therefore, live on the eaſt ſide; where, along the margin of the ſea, the coaſt is pretty level; but at a ſmall diſtance from the ſhore there is a gradual aſcent. The only corn cultivated here is oats and barley; potatoes and flax are alſo produced: the only manure is the ſea-weed, which is caſt on ſhore. Artificial graſſes are unknown; and lime cannot be procured by the poor huſbandmen. On the eaſt coaſt of the iſland are two good harbours: that to the ſouth called the *Small Iſles*; the other the *Lowlandman's Bay*: there are alſo ſome anchoring places on the weſtern coaſt. The mountains of Jura abound with ſeveral kinds of red deer: and they are are alſo frequented by plenty of grouſe and black game. Mr. Pennant mentions his having "ſome obſcure account" of a worm, a native of this iſland, which, though leſs pernicious, bears ſome reſemblance to the Furia infernalis of Linnæus. There are ſeveral barrows and caſtella in the iſland; and on the coaſt, near the harbour of ſmall iſles, are the remains of a very conſiderable encampment. The ſtones of which the mountains are formed, are of white or red quartzy granite; ſome of which are brecciated, or filled with cryſtalline kernels of an amethyſtine colour. Here is great abundance of iron, and a vein of the black oxyd of mangane ſe. The climate of Jura, though neceſſarily of a very moiſt character, is conſidered to be very healthy, and favourable to longevity. When viſited by Mr. Pennant in 1772, it contained only about 750 inhabitants; but in 1793 the number was 1387. The pariſh is ſuppoſed to be the largeſt in Great Britain; and the duty the moſt troubleſome and dangerous; it compriſes Jura, Colonſay, Oronſay, Skarba, and ſeveral little iſles, divided by narrow and hazardous ſounds; forming an extent of ſixty miles; the whole of which is ſupplied by only one miniſter and an aſſiſtant. Pennant's Voyage to the Hebrides.

Jura *Sound*, on the weſtern coaſt of Argyleſhire in Scotland, is a very wide channel, except at its northern end, which ſeparates Ilay, Jura, Luing, Skarba, and ſome ſmaller iſlands, from the main land of Scotland. The ſound of Jura connects with Iſla ſound, Tarbat weſt loch, Kiliſled loch, Achaſtill loch, Crinan loch, and the Crinan canal, Graigneſs loch, &c. Ghia, Cara, Taxa, Auchmin, Borſill, Mackermores, Craggendive, Rukeel, Shunda, and other ſmall iſlands, are ſituated in this capacious ſound.

Jura, (*Juraſſus*, Lat.; *Juras*, Strabo; *Jou-rag*, i.e. the domain of God or Jupiter, in Celtic) a chain of mountains, defending, like a ſtupendous bulwark, the N.W. ſide of Switzerland. The Jura runs S.S.W. to N.N.E. from the Vouache in Savoy to the canton of Schaffhauſen, nearly parallel with the high chain of the Alps; its width towards N.W. being from about 35 to 45 miles. Its higheſt ridge is neareſt to the Alps. Aſcending from the plains of Switzerland, like the ſides of a ſteep roof, to the height of from two to three thouſand feet, (which elevation it preſerves nearly for the whole of its length,) it deſcribes an undulated line, here and there diverſified by riſing hills, which appear from 600 to 1000 feet higher than the reſt of the chain; and it is ſeen gradually to decreaſe in height towards Burgundy. The moſt elevated parts of the Jura (according to Meſſrs. Tralles and Pictet) are, the Dole, 5082 feet above the level of the ſea; the Mont Tendre, 5170; and the Reculet (the ſummit of the Thoiry) 5196 feet.

The Jura not attaining the height of the line of ſnow, is every ſpring deprived of its ſnowy covering; nor are glaciers ever ſeen on it, and it is only in ſome deep grottos, ſuch as thoſe behind Nyon, and between the Travers and Bevine vallies, that pillars and ſlabs of ice are found throughout the year. The paſture-meadows of the Jura are much drier than thoſe of the High Alps; there are, however, in ſome of its parts (for inſtance in the canton of Baſle) full as beautiful and fertile alpine meadows as there are in the central chains: indeed the ſame alpine plants are found there which in thoſe diſtricts are ſeen at the elevation of as much as 500 feet above the level of the ſea. The brown bear ſtill inhabits the weſtern deſart regions of the Jura, and is remembered to have ſeveral times made a deſcent into the Pays de Vaux.

The whole Jura conſiſts of compact lime-ſtone, the ſtratification of which affects various inclinations. Marle, gypſum, petrifactions, and iron-ores, are frequently met with almoſt in every part of it; the fineſt and ſcarceſt petrifactions are found in the department of the Jura, near Orgelet, in a mountain called Perouſe. Along the whole of the E. ſide of the Jura a ſtratum of iron-ſhot clay may be followed, which contains the iron-ore called bean-ore, and is wrought in different places. Here and there ſtrata of brown-coal and ſources of aſphaltum are ſeen in the vallies of the Jura: they owe their origin to foreſts ſwallowed up by thoſe terrible earthquakes, to which the Jura has been ſubject in paſt ages. As geologically remarkable may likewiſe be mentioned the numberleſs blocks of granite and gneiſs, diſperſed all along the eaſt ſide of the Jura, in ſome parts even to the height of 2400 feet. For a more detailed account, ſee Dr. Ebel's Bau der Erde in dem Alpen gebirge, 1805.

JURATAM—*Aſſiſa cadit in juratam.* See ASSISA.

JURATI. See JURATS.

JURATIS, *Non ponendo in.* See NON *Ponendo.*

JURATORES, DISTRINGAS. See DISTRINGAS.

JURATS, JURATI, magiſtrates in the nature of aldermen, for the government of ſeveral corporations.

Thus we meet with the mayor and jurats of Maidſtone, Rye, Winchelſea, &c.—So alſo Jerſey has a bailiff and twelve jurats, or ſworn aſſiſtants, to govern the iſland.

JURBERG, in *Geography*, a town of Samogitia; 20 miles S.S.W. of Roſienne.

JURBO, a river of South America, which runs into the gulf of Darien, N. lat. 8° 15'. W. long. 76'. 44'.

JURBY POINT, a cape on the N.W. part of the Iſle of Man, five miles W. of Ramſay. N. lat. 54° 23'. W. long. 4° 28'.

JURE, DE. See DE FACTO and POSSESSION.

JURE *Divino.* See *Right to the* CROWN and TITHES.

JURE, *Quo.* See QUO *Jure.*

IVREA, or JUREA, in *Geography*, a town of France, in the department of the Dora, late a city of Piedmont; originally a Roman colony, eſtabliſhed there during the ſixth conſulſhip of Marius, and the firſt of Valerius Flaccus; called *Eporedia.* It is ſituated partly on a plain, and partly on the declivity of a hill; the number of inhabitants is about 6000; it was the ſee of a biſhop, ſuffragan of the archbiſhop of Turin, and the cathedral is ſaid to have been anciently a temple of Apollo. It has a caſtle joining to the town, and two fortreſſes. Beſides the cathedral, it has three other pariſh churches, and ſeveral religious houſes: 20 miles N. of Turin. N. lat. 45° 24'. E. long. 7° 44'.

JUREV POVOLSKOI, a town of Ruſſia, in the government of Koſtrom, on the Volga; 73 miles E.S.E. of Koſtrom. N. lat. 57° 10'. E. long. 43° 14'.

JUREVSKA, a town of Ruſſia, in the government of Olonetz; 42 miles N.E. of Olgſkoi.

JURGIANY, a town of Lithuania, in the palatinate of Troki; 28 miles S. of Birza.

JURGISTAN, a town of Perſia, in the province of Farſiſtan; 105 miles N. of Schiras.

JURIAGUR, a town of Bengal; 30 miles S.W. of Rogonatpour. N. lat. 23° 45'. E. long. 86° 35'.

JURIDICI DIES. See DIES.

JURIEU, PETER, in *Biography*, a celebrated Proteſtant divine, was born at Mer, a ſmall town four leagues from Blois, in the year 1637. He received part of his education in Holland, but completed his ſtudies in England under his uncle, Peter du Moulin. He was admitted to holy orders in the Engliſh epiſcopal church; but on the death of his father he returned to ſucceed him at Mer, and ſubmitted to be re-ordained by Preſbyters according to the Genevan form. Jurieu, though he differed in many reſpects from the reformed, ſet himſelf up as a rigorous defender of orthodoxy. Either his opinions, or the violence of his temper, obliged him to quit the church at Mer, and another alſo at Vitry, and proved the cauſe of many mortifications which he met with at Sedan, to which he afterwards went. In 1682, through the influence of his friend Bayle, he obtained the profeſſorſhip of divinity at Rotterdam, and in connection with this he was appointed miniſter of the Walloon church in the ſame city. In 1685, Jurieu publiſhed "Prejugez legitimes contre le Papiſme," in two volumes; which was followed, in the year 1686, by a work intitled "The Accompliſhment of the Prophecies, or the approaching Deliverance of the Church:" a work in which it is proved that "Popery is the kingdom of Antichriſt; that this kingdom is not far from its ruin, and that this ruin is very ſoon to begin: that the preſent perſecution cannot continue more than three years and a half." With the expectation which the title of this book expreſſes he publiſhed "Paſtoral Letters," to prepare the minds of the reformed in France for the great revolution. The event ſoon falſified his predictions; and he acknowledged he had miſtaken the time, but firmly believed that God had raiſed up king William to execute his great deſign of humbling the perſecutor in France, and of bringing about a ſpeedy deliverance of the reformed. After this he embroiled himſelf in a controverſy with his friend Bayle, whom he uſed extremely ill, as he did many other perſons who were the objects of his diſlike, and who objected to the extravagance of his opinions. He alſo offended his beſt friends by the iraſcibility of his temper in charging M. Saurin and other eminent perſons with heterodoxy. He died at Rotterdam in 1713. His principal works are "The Hiſtory of Calviniſm and Popery;" "On the Unity of the Church;" "An Abridgment of the Hiſtory of the Council of Trent;" "Hiſtory of the Opinions and Religious Ceremonies of the Jews;" "Sermons," &c. Life of Bayle. Moreri.

JURIEWICZE, in *Geography*, a town of Lithuania, in the palatinate of Minſk; 40 miles E. of Minſk.

JURIEWO, a town of Lithuania, in the palatinate of Minſk; 20 miles E N.E. of Minſk.

JURILGUNGE, a town of Bengal, in Chittigong; 35 miles N.N.W. of Iſlamabad.

JURIN, James, in *Biography*, a phyſician of the mathematical ſect, was, during ſeveral years, an active member and ſecretary of the Royal Society of London, and, at the time of his death, in 1750, was preſident of the College of Phyſicians. He diſtinguiſhed himſelf by a ſeries of ingenious eſſays, to the number of ſeventeen, which were publiſhed in the Philoſophical Tranſactions in the years 1718, 1719, &c.; and afterwards printed collectively, in 1732, under the title of "Phyſico-Mathematical Diſſertations," in which mathematical ſcience was applied with conſiderable acuteneſs to phyſiological ſubjects. Theſe papers involved him in ſeveral philoſophical controverſies; firſt with Keill, in conſequence of his calculations in regard to the force of the contractions of the heart, againſt which alſo Senac publiſhed ſome objections, which he anſwered. Jurin computed the contractile force of the heart to be equal to fifteen pounds four ounces; that of the right ventricle being equal to ſix pounds three ounces, and that of the left to nine pounds one ounce. To Smith's Syſtem of Optics, publiſhed in 1738, Jurin added "An Eſſay upon diſtinct and indiſtinct Viſion," in which he made ſubtle calculations of the changes neceſſary to be made in the figure of the eye to accommodate it to the different diſtances of objects. This paper was commented on by Robins, to whom Jurin wrote a reply. He had likewiſe controverſies with Michelotti reſpecting the force of running water, and with the philoſophers of the ſchool of Leibnitz on living forces. He communicated to the Royal Society ſome experiments made with a view to determine the ſpecific gravity of the human blood, and he contributed much to the improvement of their meteorological obſervations. He was a warm partiſan and an active defender of the practice of inoculation; and in ſeveral publications, giving an account of its ſucceſs from 1723 to 1727, eſtabliſhed its utility upon the true foundation of a compariſon between the reſpective mortality of the caſual and the inoculated ſmall-pox. He did not, however, foreſee, that this practice, although preſerving the lives of thoſe who had recourſe to it, yet contributed to increaſe the mortality in general, in conſequence of keeping up an artificial epidemic, as it were, by a conſtant multiplication of the contagion. His papers in the Philoſophical Tranſactions, are to be found in vols. lx. to lxvi. incluſive. Eloy. Dict. Hiſt. Gen. Biog.

JURINGI, in *Geography*, a town of Japan, in the iſland of Niphon; 40 miles W.N.W. of Jedo.

JURIS Utrum, in *Law*, a writ called the parſon's writ of right (Booth. 221.), which lies for the parſon of a church, or prebendary, at common law, and for a vicar by ſtat. 14 Ed. III. c. 17. whoſe predeceſſor hath alienated the lands and tenements thereof, by which they may recover lands and tenements belonging to the church, or of which they were diſſeiſed; or which were recovered againſt them by verdict, confeſſion, or default, without praying in aid of the patron and ordinary; or on which any perſon has intruded ſince the predeceſſor's death. (F. N. B. 48, 49.) But ſince the reſtraining ſtatute of 13 Eliz. c. 10. whereby the alienation of the predeceſſor, or a recovery ſuffered by him of the lands of the church, is declared to be abſolutely void, this remedy is of little uſe, unleſs where the parſon himſelf has been deforced for more than twenty years (Booth. 221); for the ſucceſſor, at any competent time after his acceſſion to the benefice, may enter, or bring an ejectment.

JURISCONSULTUS, or Jureconsultus, Ictus, among the Romans, was a perſon learned in the law; a maſter of the Roman juriſprudence; who was conſulted on the interpretation of the laws and cuſtoms, and the difficult points in law-ſuits.

The fifteen books of the Digeſt were compiled wholly from the anſwers, or reports, of the ancient juriſconſulti. Trebonianus, in deſtroying the two thouſand volumes from whence the Code and Digeſt were taken, has deprived the public of many things, which would have given them light into the office of the ancient juriſconſulti.

We ſhould ſcarce have known any thing beyond their bare names, had not Pomponius, who lived in the ſecond century, taken care to preſerve ſome circumſtances of their office.

The Roman juriſconſulti ſeem to have been the ſame with our chamber counſellors, who arrived at the honour of being conſulted, through age and experience, but never pleaded at the bar. Their pleading advocates or lawyers never became juriſconſulti.

In the times of the commonwealth, the *advocati* had by much the more honourable employment, as being in the ready way to attain to the higheſt preferments. They then deſpiſed the juriſconſulti, calling them in deriſion *formularii* and *leguleii*, as having invented certain forms and monoſyllables, in order to give their anſwers the greater appearance of gravity and myſtery. But in proceſs of time they became ſo much eſteemed, that they were called *prudentes* and *ſapientes*, and the emperors appointed the judges to follow their advice. Auguſtus at length advanced them to be public officers of the empire; ſo that they were no longer confined to the petty counſels of private perſons.

Bern. Rutilius has written the lives of the moſt famous juriſconſulti, who have lived within theſe two thouſand years.

JURISDICTION, a power, or authority, which a man has to do juſtice in caſes of complaints made before him. There are two kinds of juriſdiction; the one *eccleſiaſtical*, the other *ſecular*.

Secular, belongs to the king, and his juſtices, or delegates.

The courts and judges at Weſtminſter have juriſdiction all over England, and are not reſtrained to any county or place; but all other courts are confined to their particular juriſdictions, which if they exceed, whatever they do is erroneous. There are three ſorts of inferior juriſdictions; the firſt is *tenere placita*, to hold pleas, and the plaintiff may ſue either there or in the king's courts. Another is the conuſance of pleas, where a right is inveſted in the lord of the franchiſe to hold pleas; and he is the only perſon that can take advantage of it, by claiming his franchiſe. The third ſort is an exempt juriſdiction, as where the king grants to ſome city, that the inhabitants ſhould be ſued within their city, and not elſewhere; though there is no juriſdiction that can withſtand a *certiorari* to the ſuperior courts. Among the various beneficial regulations of Edward I. he defined the limits of the ſeveral temporal courts of the higheſt juriſdiction, thoſe of the king's bench, common pleas, and exchequer, ſo as they might not interfere with each other's proper buſineſs: to do which they muſt now have recourſe to a fiction, very neceſſary and uſeful to the preſent enlarged ſtate of property. He alſo ſettled the boundaries of the inferior courts in counties, hundreds, and manors; confining them to cauſes of no great amount, according to their primitive inſtitution. See Justice, and Court.

Eccleſiaſtical juriſdiction belongs to biſhops and their deputies. See Bishop, and Official.

Biſhops, &c. have two kinds of juriſdiction; the one in-

ternal, which is exerciſed over the conſcience in things purely ſpiritual; and this they are ſuppoſed to hold immediately of God.

The other is *contentious*, which is a privilege ſome princes have given them in terminating diſputes between eccleſiaſtics and laymen. (See Contentious.) Edward I. gave a mortal wound to the encroachments of the pope and his clergy, by limiting and eſtabliſhing the bounds of eccleſiaſtical juriſdiction; and by obliging the ordinary, to whom all the goods of inteſtates at that time belonged, to diſcharge the debts of the deceaſed.

Jurisdiction, *Encroachment of*, an injury, cognizable by the courts of the common law, which conſiſts in calling one "coram non judice," to anſwer in a court that has no legal cognizance of the cauſe. For this injury the common law has provided a remedy by the writ of prohibition. See Prohibition.

Jurisdiction, *Plea to the*, is where an indictment is taken before a court that hath no cognizance of the offence: as if a man be indicted for a rape at the ſheriff's tourn, or for treaſon at the quarter ſeſſions: in theſe, or ſimilar caſes, he may except to the juriſdiction of the court, without anſwering at all to the crime alleged. 2 Hal. P. C. 236. See Dilatory Pleas.

JURISPRUDENCE, the ſcience of what is juſt and unjuſt, or of the laws, rights, cuſtoms, ſtatutes, &c. neceſſary for the doing of juſtice.

Civil juriſprudence is that of the Roman law; *canonical* that of the canon law; and *feudal*, that of fees.

JURJURA, in *Geography*, a mountain of Africa, the higheſt in Barbary, anciently called the "Mons ferratus." It is, ſays Shaw (in his Travels) at leaſt eight leagues long; and if we except a pool of good water, bordered round with arable ground, that lies near the middle of it, the whole, from one end to another, is a continued range of naked rocks and precipices. In the winter ſeaſon the ridge of this mountain is covered with ſnow: and it is remarkable, that whilſt the inhabitants of one ſide of it maintain an hereditary implacable animoſity againſt thoſe of the other, yet, by conſent, this border of ſnow puts a full ſtop to all hoſtilities during that ſeaſon: which, like thoſe of the cranes and pigmies, as related by the poet, are renewed with freſh vigour in the ſpring:

> Ηέριαι δ' αρα ταιγε κακὴν ἔριδα προφέρονται.
>
> Il. γ. v. 7.

This mountain lies between Dellys (Ruſcurium) and Boujeiah (Saldis).

JURKONE, a town of Hindooſtan, in the circar of Kitchwara; 15 miles S. of Budawar.

JURMO, a ſmall iſland in the Baltic, between the iſland of Aland and the coaſt of Finland. N. lat. 60° 33'. E. long. 20° 52'.

JURO, or Devil's *Iſland*, a ſmall iſland in the Grecian Archipelago. N. lat. 39° 33'. E. long. 24° 15.'

JUROCO, a town of Brazil, in the province of Minas Geraes; 110 miles S.W. of Villa Rica.

JUROR, Jurator, in a *Legal Senſe*, is one of thoſe twenty-four, or twelve men, who are ſworn to deliver truth upon ſuch evidence as ſhall be given them touching any matter in queſtion.

The puniſhment of petty jurors attainted of giving a verdict contrary to evidence, willingly, is very ſevere. See Attaint.

The practice, heretofore in uſe, of fining, impriſoning, or otherwiſe puniſhing jurors, merely at the diſcretion of the court, for finding their verdict contrary to the direction of the judge, was arbitrary, unconſtitutional, and illegal, and was treated as ſuch by ſir Thomas Smith, more than 200 years ago; who accounted "ſuch doings to be very violent, tyrannical, and contrary to the liberty and cuſtom of the realm of England." For, as ſir Matthew Hale well obſerves (2 Hal. P. C. 313.), it would be a moſt unhappy caſe for the judge himſelf, if the priſoner's fate depended upon his directions: unhappy alſo for the priſoner; for if the judge's opinion muſt rule the verdict, the trial by jury would be uſeleſs. Yet in many inſtances, where, contrary to evidence, the jury have found the priſoner guilty, their verdict hath mercifully been ſet aſide, and a new trial granted by the court of king's bench; for in ſuch caſe, as it hath been ſaid, it cannot be ſet right by attaint. But there hath yet been no inſtance of granting a new trial where the priſoner was *acquitted* upon the firſt. 2 Hawk. P. C. 442. Blackſt. Com. b. iv.

Jurors, *Challenge to the*. See Challenge.

JUROUDA, in *Geography*, a town of Hindooſtan, in the circar of Chandaree; 15 miles S.E. of Seronge.

JUROZEE, a town of Ruſſian Lithuania; 80 miles S.E. of Minſk.

JUR-TCHEREMONSKOI, a town of Ruſſia, in the government of Toboſk, on the Oby; 68 miles S. W. of Tomſk.

JURVA, a town of Sweden, in the government of Waſa; 32 miles N.N.E. of Chriſtianſtadt.

JURUCUA, in *Zoology*, the Braſilian name of a ſpecies of tortoiſe. This has feet almoſt in ſhape of wings, the fore ones about ſix inches long, the hinder ones conſiderably ſhorter; its tail is ſhort, and of a conic figure; its eyes large and black; its mouth has no teeth, but reſembles the beak of a bird. It frequently grows to four feet long, and about three in width; its ribs are faſtened to the ſhell, and are eight on each ſide; the middle ones of theſe are the longeſt, the fore and hinder ones being the ſhorter. The fleſh and eggs of this ſpecies are very delicately taſted; they lay their eggs in holes on the ſea-ſhore, covering them over with ſand, and leaving them for the ſun to hatch them. There are uſually a great many very odd figures, like geometrical lines, running in various directions on the ſhell; the whole ground of the ſhell is uſually black and very gloſſy, adorned with yellow variegations; but this is no certain character of the ſpecies, the varieties in the colouring of theſe ſhells being very great. See Testudo *Mydas*.

JURUNCAPEBA, in *Ichthyology*, the name of a ſea-fiſh, of the turdus or wraſſe kind, caught about the ſhores of the Braſils, and called alſo *itaiara*. It is uſually about five or ſix inches long, about a third part of its length in breadth; its mouth is extremely large and wide, and of a ſomewhat triangular figure.

It is caught among the rocks, and is a very delicate fiſh for the table.

JURUNGE, in *Geography*, a town of Hindooſtan, in Bahar, on the Bogmutty; 13 miles W. of Durburgah.

JURURA, in *Zoology*, the name of a ſpecies of tortoiſe, common in the Braſils. It is a ſmall kind, ſeldom exceeding ten fingers in breadth, and eight or nine in length, and of an elliptic figure; its under ſhell is about nine fingers long, and four and a half broad, and is flat; it can at pleaſure hide its whole body in the ſhell, or thruſt out its neck to three fingers' breadth diſtance; the head is thick and long, the noſe elevated and pointed; the mouth is large, and the eyes black; it has four long claws on its feet; its tail is ſhort and pointed; and its ſkin is rough and ſcaly. The upper ſhell is brown, the lower yellow; its eggs are white and round, and about half the ſize of a hen's egg, and are very well taſted.

JURY, in *Common Law*, ſignifies twenty-four, or twelve men, ſworn to inquire of a matter of fact, and declare the truth, upon ſuch evidence as ſhall be delivered them touching the matter in queſtion.

The mode of trial by jury, called alſo the trial "per pais," or "by the country," is very ancient, and ſeems to have been coeval with the civil government of this nation. Some authors have endeavoured to trace the original of juries up as high as the Britons themſelves, the firſt inhabitants of our iſland; it is certain, however, that they were in uſe among the earlieſt Saxon colonies, their inſtitution being aſcribed by biſhop Nicholſon to Woden himſelf, their great legiſlator and captain. Sir John Spelman has repreſented Alfred as the author of trials by juries; but his proof has not been thought to be deciſive. Dr. Pettingal, who has found the uſe and practice of juries amongſt the ancient Greeks and Romans, and who thinks that the riſe of the Engliſh jury may be deduced from them, has ſupported his opinion with much ingenuity and learning.

Traces of this mode of trial in Germany have been thought to be viſible in the 100 co-aſſeſſors, mentioned by Tacitus, as choſen out of the Ingenui, which the lord of a territory had when he ſat in judgment. This number, ſays Mr. Carte, prevailed undoubtedly among the Saxons, as it did likewiſe in all the northern nations, till ſucceeding times gave occaſion to ſome alterations. Thus, among the Danes, the number of theſe aſſeſſors was reſtrained to twelve in the time of Redner Ladebrog; and the ſame number is ſtill kept up in Sweden. When it was firſt thus reduced in England does not appear from any paſſage in our old hiſtorians. Nevertheleſs, Mr. Carte infers, that this was the eſtabliſhed number in Alfred's time, from his hanging Cadwine for ſentencing a man to that kind of death, without the aſſent of all the twelve jurors, upon whom he had put himſelf to be tried; and from the laws which he gave to Gothurn. According to the ſame hiſtorian, it is very probable that Alfred was the author of extending to *civil* cauſes the trial by jury, which had been, perhaps, uſed before only in *criminal* caſes. Sir William Blackſtone contends, that this is a mode of trial which has prevailed time out of mind in this nation. Accordingly he ſays, traces of juries may be found in the laws of all thoſe nations which adopted the feudal ſyſtem, as in Germany, France, and Italy, and in England we find actual mention of them ſo early as the laws of king Ethelred, and even then not as a new invention. The truth, ſir William ſays, ſeems to be, that this tribunal was univerſally eſtabliſhed among all the northern nations; and ſo interwoven in their very conſtitution, that the earlieſt accounts of one, give us alſo ſome traces of the other. On the other hand, there are not wanting conſiderable names, who refer the introduction of juries into England to a much later period. Dr. Hickes, who finds the original of this inſtitution in Scandinavia, aſſerts, that it was not known to the Saxons, and that it did not take place in our own country till after the Norman conqueſt. Mr. Barrington and Dr. Henry, in deference, as it ſhould principally ſeem, to Dr. Hickes's profound knowledge in Saxon learning, have given their ſanction to theſe ſentiments: but it clearly appears that they have done ſo without ſufficient reaſon. The eſtabliſhment and uſe of this mode of trial in our iſland, though for a time greatly impaired and ſhaken by the introduction of the Norman trial by battle, were ſo highly eſteemed and valued by the people, that no conqueſt, no change of government, could ever prevail to aboliſh it. In "Magna Carta" it is more than once inſiſted on, as the principal bulwark of our liberties. (See Judicium *parium*) And it has been ever eſteemed, in all countries capable of appretiating its importance and utility, a privilege of the higheſt and moſt beneficial nature.

Trials by jury in civil cauſes are of two kinds; extraordinary and ordinary. The firſt ſpecies of extraordinary trial by jury is that of the grand aſſize. See Assizes.

Another ſpecies of extraordinary juries, is the jury to try an *Attaint*; which ſee.

With regard to the ordinary trial by jury in civil caſes, when an iſſue is joined, the court awards a writ of *venire facias*, which is accordingly iſſued to the ſheriff. Thus the cauſe ſtands for a trial *at the bar* of the court itſelf, provided it be of conſequence; but all trifling ſuits are ended in the court baron, hundred, or county courts. However, when the uſage began to bring actions of any trifling value in the courts of Weſtminſter-hall, it was found very inconvenient to compel the parties, witneſſes, and jurors, to come from the remoteſt parts of the country to try a trivial action at Weſtminſter; and, therefore, the legiſlature referred matters in iſſue to the juſtices of aſſiſe. Accordingly it was enacted by 13 Edw. I. cap. 30. that a clauſe of *niſi prius* ſhould be inſerted in all the writs of *venire facias*, by virtue of which the ſheriff returned his jurors to the court of the juſtices of aſſiſe, which was ſure to be held in the vacation before Eaſter and Michaelmas terms, and there the trial was had. But this method was inconvenient, and therefore was altered by 42 Edw. III. cap. 11. which ſtatute enacted, that no inqueſts, except of aſſiſe and gaol delivery, ſhould be taken by writ of *niſi prius*, till after the ſheriff had returned the names of the jurors to the court above. It is now the courſe to make the ſheriff's *venire* returnable on the laſt return of the ſame term wherein iſſue is joined, *viz.* Hilary or Trinity terms, which are called iſſuable terms; and he returns the names of the jurors in a panel, *i.e.* little pane, or oblong piece of parchment, annexed to the writ. This jury is not ſummoned, and therefore not appearing at the day, muſt unavoidably make default: for which reaſon a compulſive proceſs is now awarded againſt the jurors, called in the common pleas a writ of *habeas corpora juratorum*, and in the king's bench a *diſtringas*. The entry, therefore, on the roll or record is, "that the jury is reſpited, through defect of the jurors, till the firſt day of the next term, then to appear at Weſtminſter; unleſs before that time, *viz.* on Wedneſday the fourth of March, the juſtices of our lord the king appointed to take aſſizes in that county ſhall have come to the place aſſigned for holding the aſſizes, &c." And as the judges are ſure to come and open the circuit commiſſions on the day mentioned in the writ, the ſheriff returns and ſummons this jury to appear at the aſſizes, and there the trial is had before the juſtices of aſſize and *niſi prius*; among whom are uſually two of the judges of the courts at Weſtminſter, the whole kingdom being divided into ſix circuits for this purpoſe. If the ſheriff be not an indifferent perſon, or if he be a party in the ſuit, or be related either by blood or affinity to either of the parties, the *venire* ſhall be directed, not to him, but to the coroners; and if any exception lies againſt them, to two clerks of the court, or to two perſons of the county named by the court and ſworn, and called *eliſors*, or electors, who ſhall indifferently name the jury, and their return is final. In order farther to remove all ſuſpicion of partiality, it is provided by the ſtatutes 4 Edw. III. cap. 2. 8 Ric. II. cap. 2. and 33 Hen. VIII. cap. 24. that no judge of aſſize ſhould hold pleas in any county where he was born or inhabits. See 12 Geo. II. c. 27. and Justices *of Oyer*, &c.

When the general day of trials is fixed, the plaintiff, or his attorney, muſt bring down the record to the aſſizes, and enter it with the proper officer, in order to its being called in courſe. If it be not ſo entered, it cannot be tried; therefore it is in the plaintiff's breaſt to delay any trial by not carrying down the record, unleſs the defendant undertakes to bring on the trial by giving proper notice to the plaintiff. This proceeding is called the trial by proviſo. However, this practice hath begun to be diſuſed, ſince the ſtatute 14 Geo. II. cap. 17, which enacts, that if, after iſſue joined, the cauſe is not carried down to be tried according to the courſe of the court, the plaintiff ſhall be eſteemed to be non-ſuited, and judgment ſhall be given as in caſe of a non-ſuit. In caſe the plaintiff intends to try the cauſe, he is bound to give the defendant (if he lives within forty miles of London) eight days notice of trial; and if he lives at a greater diſtance, fourteen days notice; and if he changes his mind, and does not countermand the notice ſix days before the trial, he ſhall be liable to pay coſts to the defendant for not proceeding to trial, by the laſt-mentioned ſtatute. The defendant, however, or plaintiff, may, upon good cauſe ſhewn to the court above, as upon abſence or ſickneſs of a material witneſs, obtain leave upon motion to defer the trial of the cauſe till the next aſſizes. But when the cauſe is called on regularly in court, the record is conveyed to the judge, while the jury is called and ſworn. To this end the ſheriff returns his compulſive proceſs, the writ of *habeas corpora*, or *diſtringas*, with the panel of jurors annexed, to the judge's officer in court. The jurors contained in the panel are either ſpecial or common jurors. See *Special* JURY.

A *common* jury is one returned by the ſheriff, according to the directions of the ſtatute 3 Geo. II. cap. 25, which appoints that the ſheriff or officer ſhall not return a ſeparate panel for every ſeparate cauſe, as formerly; but one and the ſame panel for every cauſe to be tried at the ſame aſſizes, containing not leſs than forty-eight, nor more than ſeventy-two jurors: and that their names, being written on tickets, ſhall be put into a box or glaſs: and when each cauſe is called, twelve of theſe perſons, whoſe names ſhall be firſt drawn out of the box, ſhall be ſworn upon the jury, unleſs abſent, challenged, or excuſed; or unleſs a previous view of the lands or tenements, or other matters in queſtion, ſhall have been thought neceſſary by the court (ſtat. 4 Ann. c. 16.); in which caſe ſix or more of the jurors returned, to be agreed on by the parties, or named by a judge, or other proper officer of the court, ſhall be appointed to take ſuch a view, and then ſuch of the jury as have appeared upon the view, ſhall be ſworn on the inqueſt, previous to any other jurors.

Liſts of the jurors qualified according to the acts 4 & 5 W. & M. cap. 24. 7 & 8 W. III. cap. 32. and 3 & 4 Ann. cap. 18. are now to be made from the rates of each pariſh. The juſtices at Midſummer ſeſſions are to iſſue warrants to the high conſtables who require the petty conſtables to prepare ſuch liſts; and if the high conſtables neglect to iſſue their precepts for this purpoſe, they ſhall forfeit 10*l.* Theſe liſts are to be fixed on the doors of churches, &c. twenty days before Michaelmas, that public notice may be given of perſons omitted who are qualified, and of perſons inſerted, who ought to be omitted. (3 Geo. II. cap. 25.) And if any perſons are inſerted wrongfully, or omitted for the ſake of reward, &c. the petty conſtable incurs a forfeiture of 20*s.* The liſts ſhall be delivered by the petty conſtables, at Michaelmas ſeſſions, in open court; or when they are ſubſcribed by them, and atteſted on oath, and alſo ſigned by the juſtice, they ſhall be delivered by the petty conſtables to the high conſtables, who ſhall deliver them, upon oath, in open court. The conſtable failing to make ſuch return ſhall forfeit 5*l.* Perſons not qualified may be diſcharged by the juſtices at the ſeſſions. Theſe liſts ſhall be then fairly entered in a book by the clerk of the peace, on forfeiture of 20*l.* and duplicates of them ſhall, during the ſeſſions, or within ten days after, be delivered by him to the ſheriff, who ſhall cauſe the names, with their additions, &c. to be entered in a book of his own; and if the ſheriff ſhall return any perſon whoſe name is not in the duplicates, he is liable to a fine not exceeding 10*l.* nor leſs than 40*s.* (3 Geo. II. cap. 25.) Every ſummons of jurors ſhall be made by the ſheriff, his officer, or lawful deputy, ſix days before the ſeſſions at leaſt, in Wales eight days before; and in the counties palatine fourteen days before; and the penalty of neglect, or of excuſing any perſon for favour or reward, is 20*l.* by 7 & 8 W. cap. 32, or a fine of 10*l.* or under, impoſed by the judge of aſſize. (3 Geo. II. cap. 25.) No perſon ſhall be ſummoned, who has ſerved within one year before in the county of Rutland, or two years before in any other county, not being a county of a city or town, and except the counties of York and Middleſex, under a fine not exceeding 5*l.* Every perſon who has ſerved, ſhall have a certificate gratis, teſtifying his attendance. (3 Geo. II. cap. 25.) In the county of York, jurors ſhall not be returned above once in four years; and the ſheriff neglecting his duty ſhall forfeit 100*l.* and for not diſcharging a juror, who has ſerved within four years, and giving notice to the party ſummoned, ſix days before the aſſizes or ſeſſions, ſhall forfeit 20*l.* to the party with full coſts. (7 & 8 W. cap. 31. 3 & 4 Ann. cap. 18. and 10 Ann. cap. 14.) In the county of Middleſex, no perſon ſhall be returnable to ſerve as a juror, at any ſeſſions of *niſi prius*, who hath been returned in the two terms or vacations next before, on pain of the ſheriff being fined by the judge 5*l.* or under. (4 Geo. II. cap. 7.) And by 7 & 8 W. cap. 32. the inhabitants of the city and liberty of Weſtminſter ſhall be exempted from ſerving on any jury at the ſeſſions for Middleſex, by reaſon of their attendance at the courts of Weſtminſter. By the common law, jurors returned, and not appearing, ſhall loſe and forfeit the iſſues returned upon them. And if a juryman be called, and, being preſent, refuſe to appear; or, having appeared, withdraw before he be ſworn, the court may fine him at their diſcretion. (35 Hen. VIII. cap. 6.) And by 29 Geo. II. cap. 19. a juror not appearing and ſerving in any court of record within the city of London, or in any other city or town corporate, liberty or franchiſe, after being openly called three times, &c. ſhall, without reaſonable excuſe, be fined not more than 40*s.* nor leſs than 20*s.* And by 3 Geo. II. cap. 25. in cauſes of *niſi prius*, every perſon whoſe name ſhall be drawn, and who ſhall not appear without reaſonable excuſe, ſhall forfeit not exceeding 5*l.* nor leſs than 40*s.* If a juror take a bribe of either party, he ſhall forfeit ten times as much as he hath taken. (5 Edw. III. cap. 10. 34 Edw. III. cap. 8. 38 Edw. III. ſtat. 1. cap. 12.) If a man aſſault or threaten a juror for giving a verdict againſt him, he is puniſhable by fine or impriſonment; and if he ſtrike him in the court, in the preſence of a judge of aſſize, he ſhall loſe his hand and his goods, and profits of his lands during life, and ſuffer perpetual impriſonment.

The jury is to be choſen of the ſame claſs or rank with the parties, and by the policy of the ancient law, the jury was to come *de vicineto*, from the neighbourhood of the vill or place where the cauſe of action was laid in the declaration, and for want of this, the array might be challenged for defect of hundredors. However, this practice was entirely aboliſhed by 4 & 5 Ann. cap. 16. upon all civil actions, except upon penal ſtatutes: and upon thoſe alſo by the 24 Geo. II. cap. 18. the jury being now only to come, *de corpore comitatus*, from the body of the county at large, and not *de vicineto*, or from the particular neighbourhood. It is alſo enacted by 28 Edw. III. cap. 13. enforced by 8 Hen. VI. cap. 29. that where either party is an alien born, the jury ſhall be one half aliens, and the other denizens, if required, for the more impartial trial. But where both parties are aliens, the whole jury are directed to be denizens, by 21 Hen. VI. cap. 4. For other grounds of challenge and qualification of jurors, ſee CHALLENGE. Jurors in London and Weſtminſter muſt not only be houſekeepers, but have lands or goods worth one hundred pounds; and they may be examined on oath as to that point. (3 Geo. II. cap. 25.) All cities, boroughs, and corporate towns, are excepted out of the act that ſettles the qualifications of jurors for county aſſizes or ſeſſions; and triers of felons in corporations may be men worth 40*l.* in goods, though they have no freehold. Jurors in the torn ſhall have 20*s.* a-year freehold, or 26*s.* 8*d.* copyhold. Any perſon whatſoever is capable of being put upon the jury in a court-leet, and upon the coroner's jury. The qualifications of jurors, with regard to eſtate, depend upon a variety of ſtatutes. But by the laſt ſtatute 3 Geo. II. c. 25. any leaſe-holder for the term of 500 years abſolute, or for any term determinable upon life or lives, of the clear yearly value of 20*l per annum*, over and above the rent reſerved, is qualified to ſerve upon juries. By the common law every grand-juryman ought to be a freeman (1 Hawk. 255); and a freeholder (2 H. H. 155.) But in Yorkſhire, they ought to have 80*l.* a-year, freehold or copyhold. (7 & 8 W. c. 32.) Perſons excuſed from ſerving on juries are thoſe that are ſick and decrepit; thoſe not commorant in the county, and men above ſeventy years old, by 13 Edw. I. c. 38. and by 7 & 8 Will. III. c. 32 infants under twenty-one. This exemption is alſo extended, by divers ſtatutes, cuſtoms, and charters, to phyſicians, and other medical perſons, counſel, attornies, officers of the courts, and the like; all of whom, if impannelled, muſt ſhew their ſpecial exemptions. Diſſenting teachers, qualified under the toleration act, are exempted, and alſo quakers. Clergymen are alſo uſually excuſed; but if they are ſeiſed of land and tenements, they are ſtrictly liable to be impannelled in reſpect of their lay fees, unleſs they be in the ſervice of the king, or of ſome biſhop.

If, by means of challenges or other cauſe, a ſufficient number of unexceptionable jurors doth not appear at the trial, either party may pray a tales. When the legal number of twelve is obtained, they are then ſeparately ſworn, well and truly to try the iſſue between the parties, and a true verdict to give, according to the evidence; and hence they are denominated the *jury*, *jurata*, and jurors, *ſc. juratores.* Pleadings are then opened to them by counſel on that ſide which holds the affirmative of the queſtion in iſſue; the nature of the caſe, and the evidence intended to be produced are next laid before them by counſel alſo on the ſame ſide; and when their evidence is gone through, the advocate on the other ſide opens the adverſe caſe, and ſupports it by evidence; and then the party which began is heard by way of reply. See EVIDENCE.

As to ſuch evidence as the jury may have in their own conſciences, by their private knowledge of facts, it was an ancient doctrine, that this had as much right to ſway their judgment as the written or parol evidence which is delivered in court; and, therefore, it hath been often held, that though no proofs be produced on either ſide, yet the jury might bring in a verdict. But this doctrine was gradually exploded, when attaints began to be diſuſed, and new trials introduced in their ſtead. And if a juror knows any thing of the matter in iſſue, he may be ſworn as a witneſs, and give his evidence publicly in court. When the evidence on both ſides is gone through, the judge, in the preſence of the parties, the counſel, and all others, ſums up the whole to the jury; who, unleſs the caſe be very clear, withdraw from the bar to conſider of their verdict; and, in order to avoid intemperance and cauſeleſs delay, they are to be kept without meat, drink, fire, or candle, unleſs by permiſſion of the judge, till they are all unanimouſly agreed. And if they eat or drink, or have any eatables about them, without conſent of the court, and before verdict, it is finable; and if they do ſo at his charge for whom they afterwards find, it will ſet aſide the verdict. Alſo, if they ſpeak with either of the parties or their agents, after they are gone from the bar, or if they receive any freſh evidence in private, or if, to prevent diſputes, they caſt lots for whom they ſhall find, any of theſe circumſtances will entirely vitiate the verdict. And it has been held, that if the jurors do not agree in their verdict before the judges are about to leave the town, though they are not to be threatened or impriſoned, the judges are not bound to wait for them, but may carry them round the circuit from town to town in a cart. When they are all unanimouſly agreed, the jury return back to the bar; and before they deliver their verdict, the plaintiff is bound to appear in court, by himſelf, attorney, or counſel, in order to anſwer the amercement, to which by the old law he is liable, in caſe he fails in his ſuit, as a puniſhment for his falſe claim; a form which is ſtill continued, though the amercement is diſuſed; and if the plaintiff does not appear, no verdict can be given, but the plaintiff is ſaid to be *non-ſuit*. But in caſe the plaintiff appears, the jury by their foreman deliver in their verdict. When the jury have delivered in their verdict, and it is recorded in court, they are then diſcharged. Such is the proceſs of trial by jury in civil caſes; a trial which, beſides the other vaſt advantages which attend it, is as expeditious and cheap, as it is convenient, equitable, and certain. On theſe accounts, ſays judge Blackſtone, "the trial by jury ever has been, and I truſt ever will be, looked upon as the glory of the Engliſh law." It is "the moſt tranſcendent privilege which any ſubject can enjoy, or wiſh for, that he cannot be affected either in his property, his liberty, or his perſon, but by the unanimous conſent of 12 of his neighbours and equals. A conſtitution, that I may venture to affirm, has, under Providence, ſecured the juſt liberties of this nation for a long ſucceſſion of ages, and therefore a celebrated French writer (Monteſquieu), who concludes, that becauſe Rome, Sparta, and Carthage, have loſt their liberties, therefore thoſe of England muſt in time periſh, ſhould have recollected, that Rome, Sparta, and Carthage, at the time when their liberties were loſt, were ſtrangers to the trial by jury." This trial by jury, which is the grand bulwark of our liberties, as Engliſhmen, is ſecured to us by the great charter, 9 Hen. III. c 19. The antiquity and excellence of this trial, for the ſettling of civil property, have been already briefly ſtated. But if it has ſo great advantage in regulating civil property, how much muſt that advantage be heightened, when it is applied to criminal caſes! "In times of difficulty and danger," as Blackſtone has well obſerved, "more is to be apprehended from the violence and partiality of judges appointed by the crown, in ſuits between the king and the ſubject, than in diſputes between one individual and another, to ſettle the metes and boundaries of private property. Our law has therefore wiſely placed this ſtrong and twofold barrier, of a preſentment and a trial by jury, between the liberties of the people, and the prerogative of the crown."—"The founders of the

Engliſh law have with excellent forecaſt contrived, that no man ſhould be called to anſwer to the king for any capital crime, unleſs upon the preparatory accuſation of 12 or more of his fellow-ſubjects, the grand jury; and that the truth of every accuſation, whether preferred in the ſhape of indictment, information, or appeal, ſhould afterwards be confirmed by the unanimous ſuffrage of 12 of his equals and neighbours, indifferently choſen, and ſuperior to all ſuſpicion. So that the liberties of England cannot but ſubſiſt, ſo long as this *palladium* remains ſacred and inviolate: not only from all open attacks, (which none will be ſo hardy as to make), but alſo from all ſecret machinations, which may ſap and undermine it; by introducing new and arbitrary methods of trial, by juſtices of the peace, commiſſioners of the revenue, and courts of conſcience. And however *convenient* theſe may appear at firſt, (as, doubtleſs, all arbitrary powers, well executed, are the moſt *convenient*,) yet let it be again remembered, that delays, and little inconveniences in the forms of juſtice, are the price that all free nations muſt pay for their liberty in more ſubſtantial matters; that theſe inroads upon this ſacred bulwark of the nation are fundamentally oppoſite to the ſpirit of our conſtitution; and that, though begun in trifles, the precedent may gradually increaſe and ſpread, to the utter diſuſe of juries in queſtions of the moſt momentous concern."

In criminal caſes, it is provided by the equity and lenity of the Engliſh laws, that no man ſhould be called to anſwer for any capital crime, unleſs, as we have already ſtated, upon the preparatory accuſation of twelve or more of his fellow-ſubjects, called the *grand* jury. This jury conſiders all bills of indictment againſt criminals preferred to the court, which they either approve or find, by writing upon them *billa vera*, or diſallow, by indorſing *ignoramus*, and generally conſiſts of gentlemen that are freeholders of ſuperior quality to thoſe who form the *petit* jury, who try the priſoners indicted by the other jury, and convict them by verdict.

When a priſoner, on his arraignment, has pleaded not guilty, and for his trial hath put himſelf upon the country, which country the jury are, the ſheriff of the county muſt return a panel of jurors that are freeholders, without juſt exception, and of the *viſne*, or neighbourhood, *i. e.* of the county where the fact is committed. If the proceedings are before the court of king's bench, there is a time allowed, between the arraignment and the trial, for a jury to be impanelled by a writ of *venire facias* to the ſheriff, as in civil cauſes; and the trial in caſe of a miſdemeſnor, is had at *niſi prius*, unleſs it be of ſuch conſequence as to merit a trial at bar; which is always invariably had, when the priſoner is tried for any capital offence. But, before commiſſioners of *oyer and terminer*, and gaol delivery, the ſheriff, by virtue of a general precept, directed to him beforehand, returns to the court a panel of forty-eight jurors, to try all felons that may be called upon their trial at that ſeſſion; and, therefore, it is uſual to try all felons immediately, or ſoon after their arraignment. But perſons indicted of ſmaller miſdemeſnors, uſually give ſecurity to the court to appear, for trial at the next aſſizes or ſeſſion. See INDICTMENT.

When the trial is called on, the jurors are to be ſworn, as they appear to the number of twelve, unleſs they are challenged by the party. (See CHALLENGE, & *ſupra*.) *Tales* may be awarded as in civil cauſes, till the number of twelve is ſworn, "well and truly to try, and true deliverance make, between our ſovereign lord the king, and the priſoner whom they have in charge; and a true verdict to give, according to the evidence." When the jury is ſworn, if it be a cauſe of any conſequence, the indictment is uſually opened, and the evidence ſtated by the counſel for the crown, or proſecution. But it is a ſettled rule at common law (inconſiſtent, indeed, with the humane treatment of priſoners by the Engliſh laws, but palliated by the declaration of law, that the judge ſhall be counſel for the priſoner, *i. e.* ſhall ſee that the proceedings againſt him are legal and ſtrictly regular) that no counſel ſhall be allowed a priſoner upon his trial, upon the general iſſue, in any capital crime, unleſs ſome point of law ſhould ariſe proper to be debated. (2 Hawk. P.C. 400.) However, the judges never ſcruple to allow a priſoner counſel to ſtand by him at the bar, and inſtruct him what queſtions to aſk, or even to aſk queſtions for him, with reſpect to matters of fact; for as to matters of law, ariſing on the trial, they are entitled to the aſſiſtance of counſel. When the evidence on both ſides is cloſed, the jury cannot be diſcharged, (unleſs in caſes of evident neceſſity,) till they have given in their verdict; but are to conſider of it and deliver it in, with the ſame forms as upon civil cauſes; only that they cannot, in a criminal caſe, give a privy verdict. (2 Hal. P. C. 300. 2 Hawk. P. C. 439.) But an open verdict may be either general, guilty or not guilty; or ſpecial, ſetting forth all the circumſtances of the caſe, and praying the judgment of the court, whether, for inſtance, on the facts ſtated, it be murder, manſlaughter, or no crime at all. (See VERDICT and JURORS.) If the jury find the priſoner not guilty, he is then for ever diſcharged of the accuſation, except he be appealed of felony within the time limited by law. (See APPEAL.) And upon ſuch his acquittal, or diſcharge for want of proſecution, he ſhall be immediately ſet at large, without payment of any fee to the gaoler. (Stat. 14 Geo. III. c. 20.) But if they find him guilty, he is ſaid to be *convicted* of the crime whereof he ſtands indicted. On a conviction for any felony, in general, the reaſonable expences of proſecution are, by ſtat. 25 Geo. II. cap. 36. and 18 Geo III. c. 19. to be allowed to the proſecutor out of the county ſtock, if he petitions the judge for that purpoſe; and if he be poor, a compenſation for his trouble and loſs of time; and by 27 Geo. II. cap. 3. explained by ſtat. 18 Geo. III. c. 19. poor perſons bound over to give evidence are likewiſe entitled to be paid their charges, as well without conviction as with it. Moreover, on a conviction of larceny in particular, the proſecutor ſhall have reſtitution of his goods, by 21 Hen. VIII. cap. 11. which enacts, that if any perſon be convicted of larceny by the evidence of the party robbed, he ſhall have full reſtitution of his money, goods, and chattels; or the value of them out of the offender's goods, if he has any, by a writ to be granted by the juſtices; and this writ ſhall reach the ſtolen goods, though the property of them is transferred to another by ſale in open market. (1 Hal. P.C. 543.) Without ſuch writ of reſtitution, the party may peaceably retake his goods whereſoever he finds them. And if the felon be convicted and pardoned, or allowed his clergy, the party robbed may bring his action of trover againſt him for his goods, and recover a ſatisfaction in damages. Such are the proceedings and conſequences of a trial by jury in criminal caſes. See Blackſt. Comm. book iii. iv.

JURY, *Special*. Where it is conceived that an indifferent impartial jury will not be returned between party and party by the ſheriff, the court upon motion will order the ſheriff to attend the ſecondary of the king's bench, with his book of freeholders of the county; and the ſecondary, in the preſence of the attornies on both ſides, is to ſtrike a jury. And when a cauſe of conſequence is to be tried at the bar, the court of king's bench, on motion and aſſidavit made, will make a rule for the ſecondary to name forty-eight freeholders; and each party is to ſtrike out twelve, one at a time, the plaintiff, or his attorney, beginning firſt; and from the remainder the jury for the trial are to be drawn. This is called a *ſpecial* jury.

By the ſtat. 3 Geo. II. cap. 25. either party is entitled upon motion to have a ſpecial jury ſtruck upon the trial of any iſſue, as well at the aſſizes as at bar; he paying the extraordinary expence, unleſs the judge's writ certify, in purſuance of the ſtat. 24 Geo. II. cap. 18. that the cauſe required ſuch ſpecial jury. And no perſon ſerving on a ſpecial jury ſhall be allowed more than the ſum which the judge ſhall think reaſonable, not exceeding one guinea, except in caſes where a view is directed. When any ſpecial jury ſhall be ordered by rule of the court of Weſtminſter, in any cauſe ariſing in any city, &c. the jury is to be taken out of liſts, or books of perſons qualified, which ſhall be produced by the ſheriffs, &c. before the proper officer. The ſame indulgence is granted both to merchants and foreigners; for where two merchants are plaintiff and defendant, a jury of merchants may be returned to try the iſſue between them; and if either of the parties in the ſuit be an alien, the jury, at the deſire of the party, is to be compoſed of half foreigners and half Engliſh.

JURIES, *Clerk of the.* See CLERK.

JURY *of Matrons.* See MATRONS.

JURY-MAST, an appellation given by ſeamen to a temporary or occaſional maſt, patched up of yards, or other pieces of timber, and ſet up in the room of a true maſt, which has been loſt in a fight, or by a ſtorm.

JURZEC, in *Geography*, a town of Lithuania, in the palatinate of Minſk; 20 miles N. of Rohaczow.

JUS, and JURA. See LAW, RIGHT, &c.

JUS *accreſcendi*, in *Law*, is the right of ſurvivorſhip between joint-tenants.

JUS *ad rem*, is an inchoate and imperfect right, ſuch as a parſon promoted to a living acquires by nomination and inſtitution; in contradiſtinction to the *jus in re*, or complete and full right, by corporal poſſeſſion.

JUS *Anglorum*, denotes the law and cuſtoms of the Weſt Saxons, in the time of the heptarchy, by which the people were for a long time governed, and which were preferred before all others.

JUS *coronæ*, *rights of the crown*, is part of the law of England, which differs in many things from the general law concerning the ſubject. Coke on Litt.

The king may purchaſe lands to him and his heirs, but he is ſeiſed thereof in *jure coronæ*; and all the lands and poſſeſſions, whereof the king is thus ſeiſed, ſhall follow the crown in deſcents, &c. See PREROGATIVE.

JUS *curialitatis Angliæ*. See COURTESY.

JUS *duplicatum*. See RIGHT.

JUS *fiduciarium*, in the *Roman Law*, a right in truſt for which there was a remedy in conſcience.

JUS *gentium*, is the law by which kingdoms, and ſociety in general, are governed.

JUS *gladii* is mentioned in our Latin authors, and the Norman laws, where it ſignifies a ſupreme juriſdiction. Camd. And hence it is, that at the creation of an earl, he is ſaid to be *gladio ſuccinctus*, to ſignify that he had a juriſdiction over the county of which he was made earl. See PLEAS *of the Sword*.

JUS *imaginum* was the foundation of civil nobility among the Romans, and denoted having the image of one anceſtor at leaſt, who had borne ſome curule office.

JUS *legitimum*, in the *Roman Law*, a legal right which was remedied by the ordinary courſe of law.

JUS *patronatus*, is a commiſſion granted by the biſhop to ſome perſons to enquire who is the rightful patron of a church. If two patrons preſent their clerks, the biſhop ſhall determine who ſhall be admitted by right of patronage, &c. or commiſſion of enquiry by ſix clergymen and ſix laymen, living near the church; who are to enquire on articles as a jury, whether the church is void? who preſented laſt? who is the rightful patron? &c. But if coparceners ſeverally preſent their clerks, the biſhop is not obliged to award a *jus patronatus*, becauſe they preſent under one title; and are not in like caſes, where two patrons preſent under ſeveral titles. The awarding a *jus patronatus* is not of neceſſity, but at the pleaſure of the ordinary, for his better information who hath the right of patronage: for if he will at his peril take notice of the right, he may admit the clerk of either of the patrons, without a *jus patronatus*.

JUS *precarium*, in the *Roman Law*, a right in courteſy, for which the remedy was only by intreaty or requeſt.

JUS *quale*. See QUALE *jus*.

JUS *togæ*. See TOGA.

JUSKPOUR, in *Geography*, a circar of Hindooſtan, in the country of Oriſſa, bounded on the N. by Surgooja, on the E. by a part of Bahar, on the S. by the circars of Gangpour and Ruttunpour, and on the W. by Ruttunpour. The capital is Odeypour.

JUSOFIE, a town of Arabia, in the province of Hadsjar, on the S. coaſt of the Perſian gulf. N. lat. 25° 34'. E. long. 50° 30'.

JUSQUIAMUS, in *Botany*, a name uſed by ſome authors for the hyoſcyamus, or henbane.

JUSSAUHA, in *Geography*, a town of Hindooſtan, in Moultan; 14 miles W. of Toulomba.

JUSSEY, a town of France, in the department of the Upper Saone, and chief place of a canton, in the diſtrict of Veſoul, ſituated on the Amance; 15 miles N.W. of Veſoul. The place contains 3033, and the canton 14,776 inhabitants, on a territory of 227½ kiliometres, in 22 communes. N. lat. 47° 49'. E. long 5° 59'.

JUSSIÆA, in *Botany*, ſo named by Linnæus, (who, as it appears by his Tour in Lapland, v. 1. 284, had at firſt deſtined for this purpoſe the plant he afterwards called *Sibbaldia*,) in honour of the two illuſtrious brothers Antony and Bernard de Juſſieu. The former was profeſſor of botany at Paris, and wrote numerous papers in the Memoirs of the academy, being alſo the editor of the work of Barrelier. He was born at Lyons in 1686, and died at Paris, where he practiſed medicine, in 1758, aged 72. His brother Bernard, a firſt rate botaniſt, who, as Haller obſerves, was deterred by exceſs of modeſty from giving his ideas to the world, was one of the firſt who laboured at a natural ſyſtem of arrangement. His nephew, the preſent A. L. de Juſſieu, has given us a plan of his method, according to which the garden of Trianon was arranged in 1759, and which in fact laid the foundation of his own celebrated work, publiſhed in 1789. Bernard de Juſſieu was demonſtrator of botany at the Jardin du Roi, and died in 1777, aged 70. A third brother, Joſeph, travelled to South America as a ſurgeon, and ſent home dried ſpecimens of many curious plants.—Linn. Gen. 215. Schreb. 292. Willd. Sp. Pl. v. 2. 574. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. v. 2. 63. Juſſ. 319. Lamarck. Illuſtr. t. 280. Gærtn. t. 31.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Onagræ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, in five, (ſometimes but four,) ovate, acute, permanent ſegments. *Cor.* of five, (ſometimes but four,) roundiſh, ſpreading, ſeſſile, equal petals. *Stam.* Filaments ten, (ſometimes eight,) very ſhort, thread-ſhaped; anthers roundiſh. *Piſt.* Germen oblong, priſmatic, inferior; ſtyle thread-ſhaped; ſtigma capitate, flat, marked with five ſtreaks. *Peric.* Capſule oblong, angular, of four or five cells, burſting at the angles, crowned with the calyx. *Seeds* numerous, ſmall, ſmooth, and poliſhed, diſpoſed in rows upon the angles of the central column, which are oppoſite to the partitions, the latter originating from the centre of each valve. See GÆRTNER.

Eſſ. Ch. Calyx ſuperior, of four or five leaves. Petals four or five, equal. Capſule of four or five cells, oblong, burſting at the angles; partitions from the middle of the valves. Seeds numerous, minute.

Obſ. Gærtner aſſerts the difference between this genus and *Œnothera* to be merely factitious and imaginary. In our opinion the permanent, leafy, equal calyx, deſtitute of a tube, and the ſmooth, round, not angular nor ſpongy, ſeeds, are ſufficient to mark *Juſſiæa*, not to mention the undivided ſtigma, which in this tribe is perhaps of no great moment.—As to its place in the Linnæan ſyſtem we are leſs decided, and think Lamarck moſt correct in removing it to *Octandria*.

The greater number of the ſpecies are natives of the warmer parts of America; a few are found in the Eaſt Indies, or in Guinea. Linnæus defines five in his *Species Plantarum;* Willdenow has twelve.

1. J. *repens*, Linn. Sp. Pl. 555, (Nir-carambu; Rheede Hort. Mal. v. 2. 99. t. 51.)—Stem creeping. Leaves obovate, obtuſe. Flowers five-cleft. Calyx-leaves lanceolate.—This is truly an Eaſt Indian ſpecies, growing in watery places, and throwing out from its procumbent branched *ſtem*, large tufted fibrous perennial *roots*. The herbage is ſmooth. *Leaves* alternate, ſtalked, obovate, entire, veiny, obtuſe, often emarginate, an inch or more in length. *Flowers* on ſolitary, ſimple, axillary ſtalks, ſhorter than the leaves, but the ripe *fruit* and ſtalk together are about as long as each leaf. Segments of the *calyx* five, lanceolate, narrow, acute, entire. *Petals* five, roundiſh, whitiſh, with orange-coloured claws.—J. *adſcendens*, Linn. Mant. 69, appears to be the very ſame plant, deſcribed from a ſpecimen, whereas J. *repens* was originally taken up from books.

2. J. *inclinata*. Linn. Suppl. 235, (J. erecta; Amoen. Acad. v. 8. 256.)—Stem aſcending. Leaves obovate, obtuſe. Flowers four-cleft. Calyx-leaves elliptical, broad.—Sent from Surinam by Dalberg, being a part of the collection preſerved in ſpirits, which king Guſtavus III. gave Linnæus. The latter at firſt miſtook this ſpecies for a totally different one, *erecta*. It is more akin to *repens*, but larger, and the above ſpecific character ſufficiently marks it. The very broad *calyx-leaves* are remarkable.

3. J. *peruviana*. Linn. Sp. Pl. 555. (Onagra laurifolia, flore amplo pentapetalo; Feuill. Peruv. 716. t. 9, not 11.)—Stem erect. Leaves elliptic-lanceolate, acute, roughiſh. Flowers four or five-cleft. Calyx-leaves ovate, pointed, toothed.—Gathered by Feuillée about the ſides of rivers in the plain of Lima. He reports that the natives highly eſteem the bruiſed leaves, as a cooling application to diſpel tumours. Mutis ſent Linnæus a ſpecimen from Mexico, which anſwers preciſely to Feuillée's plant, except the *flowers* being four-cleft, upon which we lay no ſtreſs. The toothed *calyx* in our's is remarkable. The *petals* are large and yellow. *Leaves* roughiſh with ſhort, rigid, ſcattered hairs; their under ſide pale.

4. J. *hirta*. Willd. n. 6. (Œnothera hirta; Linn. Sp. Pl. 491. Onagra fruteſcens et hirſuta, nerii folio, flore magno luteo; Plum. Ic. 167. t. 174. f. 2.)—Stem erect, hairy. Leaves elliptic-lanceolate, acute; hairy beneath. Flowers four-cleft. Calyx-leaves ovate, pointed, entire.—Known to us only by Plumier's figure, who gathered it in ſome part of South America. If that figure be exact, the entire *calyx*, and more hairy herbage, diſtinguiſh it from the laſt. Willdenow has properly followed Swartz and Vahl in removing it from *Œnothera*.

5. J. *pubeſcens*. Linn. Sp. Pl. 555. Loefl. It. 282. n. 205.—Stem upright, hairy. Leaves oblong. Flowers five or ſix-cleft. Calyx-leaves lanceolate, pointed, hairy beneath.—Gathered by Loefling in South America. We have an unnamed ſpecimen which anſwers well enough to the ſhort accounts of this ſpecies given by authors. Of the ſynonym of Sloane we do not preſume to judge with certainty, but it appears to belong to *J. peruviana*. The *ſtem* of our plant is erect, clothed with looſe, ſpreading, white hairs, as are alſo the *leaves* more or leſs, the long ſlender *germen*, and backs of the *calyx-leaves*. The latter are ſix in every flower we have examined, lanceolate, taper-pointed, wavy, ſcarcely crenate, very ſmooth above. *Petals* ſix, white or yellowiſh. *Leaves* linear-lanceolate, near two inches long, on ſhort hairy ſtalks.

6. J. *ſuffruticoſa*. Linn. Sp. Pl. 555. (Cattu-carambu; Rheede Hort. Mal. v. 2. 97. t. 50.)—Stem erect, much branched. Leaves lanceolate, downy. Flowers four-cleft. Calyx-leaves ovate, downy beneath.—Native of the Eaſt Indies, flowering during the rainy ſeaſon. The whole plant, two or three feet high, is uſually clothed with denſe ſoft pubeſcence, though occaſionally nearly ſmooth. *Leaves* numerous, lanceolate, almoſt ſeſſile, about two inches long. *Fruit* nearly as long. The ovate four-leaved *calyx*, downy, not hairy, beneath, eſſentially diſtinguiſhes it from the laſt. Linnæus adopted this ſpecies from books; and though he had ſpecimens, never rightly determined them.

7. J. *octovalvis*. Swartz. Obſ. 142. (Œnothera octovalvis; Jacq. Amer. 102. t. 70. Linn. Sp. Pl. 492. Onagra foliis perſicariæ anguſtioribus, flore magno luteo; Plum. Ic. 168. t. 175. f. 1.)—Stem erect. Leaves lanceolate, downy. Flowers four-cleft. Calyx-leaves ovate. Capſule of eight valves. Native of wet places in the Weſt Indies. This ſeems to be the plant incorrectly figured by Merian, Inſ. Surin. t. 39. There is great difficulty in diſtinguiſhing it ſpecifically from the laſt, as we have ſeen no ſpecimen, but we have no doubt of their being different. The preſent is ſaid to be an annual plant. The *petals* are yellow, and inverſely heart-ſhaped.

8. J. *erecta*. Linn. Sp. Pl. 556. Swartz. Obſ. 173. (Onagra foliis perſicæ amplioribus, parvo flore luteo; Plum. Ic. 168. t. 175. f. 2. Carambu; Rheede Hort. Mal. v. 2. 95. t. 49.)—Stem erect. Leaves lanceolate, ſmooth. Flowers four-cleft, ſeſſile. Calyx-leaves lanceolate.—Native of marſhy places in both Indies. The *root* is ſaid to be annual. Whole plant ſmooth or nearly ſo. *Leaves* two or three inches long, ſtalked, lanceolate, pointed. *Flowers* ſmall, yellow, axillary, ſeſſile. *Calyx-leaves* ſlightly downy and three-ribbed beneath. *Fruit* obovate, not an inch long, the membranous ſides, between the ribs, becoming torn to let out the ſeeds.

9. J. *acuminata*. Swartz. Ind. Occ. v. 2. 745.—Nearly erect, ſmooth. Leaves lanceolate, broad, tapering at each end. Flowers four-cleft, nearly ſeſſile.—In low ground in the ſouth part of Jamaica, but rare. *Swartz*. This differs from the laſt in the ſingularly taper-pointed *leaves*, and in the *ſtem* being decumbent at its baſe.—The *calyx-leaves*, moreover, are deſcribed as ſomewhat ovate.

10. J. *tenella*. Burm. Ind. 103. t. 34. f. 2.—Erect, ſmooth. Leaves lanceolate, oppoſite. Flowers five-cleft, nearly ſeſſile.—Native of Java. A ſmall plant much branched. *Leaves* (according to Burmann) oppoſite, an inch long. The Camaranbaya of Marcgrave, 30, f. 1, which he quotes, is more like *J. octovalvis*.

11. J. *linearis*. Willd. n. 3.—Leaves linear, ſeſſile,

hiſpid. Flowers four-cleft.—Native of Guinea. *Stem* erect, branched, ſmooth, ſtriated, round, clothed with ſcattered hairs at the top. *Leaves* two inches or more in length, bluntiſh, ſeſſile, alternate, ſcarcely veiny, rough with minute, rigid, upright hairs. *Flowers* ſeſſile, axillary. *Germen* hiſpid.

12. J. *linifolia.* Vahl. Eclog. v. 2. 32. Willd. n. 4. Leaves and calyx-leaves linear-lanceolate, ſmooth. Flowers ſeſſile, four-cleft.—Native of South America. *Stem* herbaceous, erect, ſlender, ſmooth, branched, angular. *Leaves* nearly ſeſſile, ſcarcely an inch long, narrow, tapering at each end. *Flowers* axillary. *Leaves* of the calyx four, lanceolate, tapering, about one-fourth of an inch long. *Capſule* an inch long, ſlender, round and ſmooth. *Vahl.* S.

JUST, the meaſured can or cup out of which the monks uſed to drink their liquor. It appears from the Monaſticon, that the monks of Eveſham Abbey were allowed two juſts of beer every day; and we are informed by William of Malmſbury, that thoſe of Glaſtonbury, about the time of the Conqueſt, had their juſts filled with hydromel or mead on great feſtival days.

Just, a ſportive kind of combat on horſeback; man againſt man, armed with lances.

The word is by ſome derived from the French *jouſte*, of the Latin *juxta*, becauſe the combatants fought near one another. Salmaſius derives it from the modern Greek *Zouſtra*, or rather τζȣςρα; which is uſed in this ſenſe by Nicephorus Gregoas. Others derive it from *juſta*, which, in the corrupt age of the Latin tongue, was uſed for this exerciſe, becauſe it was ſuppoſed a more juſt and equal combat than the tournament.

Anciently, juſts and tournaments made a part of the entertainment at all ſolemn feaſts and rejoicings. The Spaniards borrowed theſe exerciſes from the Moors, and called them *juego de cannas*, *reed* or *cane-play*. Some take them to be the ſame with *ludus Trojanus*, anciently practiſed by the youth of Rome.

The Turks uſe them ſtill, and call them *lancing the gerid*.

The difference between juſts and tournaments conſiſts in this, that the latter is the genus, of which the former is only a ſpecies. Tournaments included all kinds of military ſports and engagements, which were made out of gallantry and diverſion. Juſts were thoſe particular combats where the parties were near each other, and engaged with lance and ſword; add, that the tournament was frequently performed by a number of cavaliers, who fought in a body; the juſt was a ſingle combat of one man againſt another. Though the juſts were uſually made in tournaments, after a general rencounter of all the cavaliers, yet they were ſometimes ſingly, and independent of any tournament.

He who appeared for the firſt time at a juſt, forfeited his helm, or caſque, unleſs he had forfeited before at a tournament.

Just *Appui*. See Appui.

Just, in *Biography*, a graceful and pleaſing compoſer of ſhort and eaſy progreſſive leſſons for beginners on the harpſichord or pianoforte, in Holland, about 30 years ago.

Just, *St.*, in *Geography*, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Clermont; 9 miles N. of Clermont. The place contains 823, and the canton 10,620 inhabitants, on a territory of 202½ kiliometres, in 22 communes.—Alſo, a town of France, in the department of the Marne; 10 miles S.S.E. of Sezanne.—Alſo, a town of France, in the department of the Aveiron; 6 miles S.S.E. of Sauveterre.

Just *en Chevalet, St.*, a town of France, in the department of the Loire, and chief place of a canton, in the diſtrict of Roanne; 12 miles S.W. of Roanne. The place contains 2346, and the canton 9149 inhabitants, on a territory of 217½ kiliometres, in 8 communes.

JUSTABAS, a town of South America, in the province of Tucuman; 45 miles N.W. of St. Fernando.

JUSTELL, Christopher, in *Biography*, was born at Paris in 1580. Having laid a good foundation in elementary learning at ſchool and at college, he applied his maturer ſtudies to eccleſiaſtical hiſtory, and became the author of many learned works. He died at the age of 69 in the year 1649. His principal pieces are, "Codex Canonum Eccleſiæ Univerſæ à concilio Calchedonenſi et Juſtiniano Imp. Confirmatus Gr. et Lat.;" "Codex Canonum Eccleſiaſticorum Dionyſii Exigui," &c.; "Codex Canonum Eccleſiæ Africanæ, Gr. et Lat.;" "Bibliotheca Juris Canonici Veteris;" "A Genealogical Hiſtory of the Houſe of Auvergne," &c. Juſtell was ſuppoſed to be better acquainted with the civil hiſtory and antiquities of the middle age than any perſon of his time. He kept up a correſpondence with moſt of the literary characters of his time, among whom were archbiſhop Uſher and ſir Henry Spelman.

JUSTICE, in a general ſenſe, or *univerſal* juſtice, comprehends the whole duty of man to God, to his neighbour, and to himſelf. In this latitude the term "righteouſneſs" often occurs in ſcripture. Cicero was not ignorant (De Nat. Deor. l. i. § 41.) that juſtice expreſſes more than the performance of the duties owing to our fellow-creatures; for according to his ſtatement, "Eſt enim pietas juſtitia adverſum Deos," *i. e.* Piety is juſtice towards the gods.

Justice, *Juſtitia*, in a more reſtricted ſenſe, and conſidered as a ſocial virtue, denotes a conſtant deſire, or inclination, to give every one his due; or a habit by which the mind is diſpoſed and determined to give every man his own. Accordingly juſtice has a neceſſary reſpect to the perſons and rights of others. As there is a twofold right (ſee Right), there is alſo a correſpondent diſtinction of juſtice. A right is either perfect or imperfect. A *perfect* right is that which perſons have to things properly their own, the rendering of which is the payment of a debt, rather than the conferring of a favour: a right which human laws, as well as divine, generally allow men to challenge, and aſſiſt them to recover. I am not obliged to every one who does not rob or murder me. Thus alſo, the making of a promiſe may be free, but the performance of it is not ſo. An *imperfect* right detracts nothing from the kindneſs, reſpect, and good will of thoſe who give to others what they can only claim by virtue of ſuch a right; but leaves to ſuch actions their full luſtre and merit. Notwithſtanding any ſuch right, men are obliged to their benefactors for doing what they could not have been conſtrained to do, and which demonſtrate the goodneſs and generoſity of their temper; being an act of juſtice, ſo as at the ſame time to have the nature of a gift. The offices of civility, gratitude, and charity reſt on this foundation. Juſtice, grounded on this diſtinction of right, is diſtinguiſhed into *ſimple* and *mixed*; or, according to Puffendorf, *univerſal* and *particular*; or, according to Grotius, *expletory* and *attributive*. By *ſimple* juſtice, we may underſtand juſtice in the ſtricteſt ſenſe of the term, of which Cicero ſays (De Offic. l. iii. c. 6.), "Hæc una virtus omnium eſt domina et regina virtutum;" *i. e.* "It is the miſtreſs and queen of all the other virtues." By *mixed* juſtice, we may underſtand that which has other virtues joined with it, as humanity, liberality, and the like. Thus Cicero ſays (De Offic. l. i.

c. 7, 8.), "Juſtitiæ conjuncta eſt beneficientia:" Beneficence is connected with juſtice. And again, "Injuſtitiæ duo genera," &c. There are two kinds of injuſtice, one of thoſe who do an injury to others; another with which they are chargeable, who neglect to vindicate and defend the injured, when it is in their power. To the ſame purpoſe Antoninus ſays (περι Σεαυτȣ, l. ix. c. 5.), "A man may be unjuſt not only by *doing*, but *neglecting* to do ſomething." Theſe philoſophical writers ſeem evidently to have thought, that the duties of humanity are parts of juſtice properly ſo called. *Simple* juſtice we have already defined, agreeable to the accurate definition of it in the civil law. "Juſtitia eſt conſtans et perpetua voluntas jus ſuum cuique tribuendi:" *i. e.* Juſtice is a conſtant and prevailing will, or diſpoſition, to render to every one his due.

Juſtice doth not derive its being from fear, as is affirmed by Mr. Hobbes, who ſuppoſes mankind in their natural ſtate to have a licence uncircumſcribed by any other bounds, beſides their own natural force. This licence they are induced to exchange for a more limited right in ſociety, to prevent that war of every one with every one, which would be the conſequence of every one's inſiſting upon his natural rights. "According to this hypotheſis," as Dr. Cudworth well obſerves (Intellect. Syſtem), "juſtice and civil government are plainly things not good in themſelves, nor deſirable (being a hindrance of liberty, and nothing but ſhackles and fetters), but by accident only, as neceſſary evils. They are leſſer evils ſubmitted to purely for the ſake of avoiding a greater. Hence it inevitably follows, that all men muſt be ακοντες δικαιοι, unwillingly juſt, or not with a full and perfect, but mixed will only." The true principles of juſtice are ſuch as theſe: It is reaſonable that *his* will, who is the common father of mankind, ſhould be the meaſure of their behaviour one towards another. It can never be thought a thing pleaſing to God, who has originally the ſame affection for one as for another, that one man, by fraud or violence, ſhould uſurp dominion over another, or any way moleſt or hinder him. Beſides, this would introduce confuſion into his works, the glory of which is their order and harmony. "If it be the diſpoſition of mankind," ſays Cicero (De Offic. l. iii. § 5.), that every one for his own advantage ſhould oppreſs and rob his neighbour, it is neceſſary that ſociety, which is the moſt natural ſtate of mankind, be entirely diſſolved. Juſt as in the human body, the whole muſt be weakened and deſtroyed, if every member could have this perſuaſion, and act upon it; that it ſhould flouriſh by drawing to itſelf the ſtrength and nouriſhment of the member neareſt to it." Thus from that original and univerſal ſociety to which all mankind belong, neceſſarily flow obligations to mutual juſtice; and Mr. Hobbes's ſtate of war appears to contradict the very firſt view of human nature. But beſides this general ſociety, particular civil ſocieties have, by the direction of nature, been erected in ſeveral parts of the world. The Author of nature has formed his rational creatures with a ſtrong bent and inclination to combine into bodies politic. It is inclination, therefore, which makes men ſeek ſociety, not the bare proſpect of benefiting themſelves by it; to ſatisfy nature more than to defend themſelves from violence. When ſocieties are formed, though juſtice be neceſſary to make them flouriſh, and hence we infer the will of the great governor of the world; yet in the nature of things, the obligation to juſtice is antecedent to any ſociety whatſoever. From the inclination to ſociety with which God hath made man, we infer his will to be, that juſtice ſhould be cultivated, which is neceſſary to the ſupport of ſociety; but civil ſociety is not the original of juſtice. Another principle of juſtice is, that the good of the whole is to be preferred before the good of any one part. Is it good, pleaſing to a moſt benevolent creator, and conſequently deſerving the approbation and concurrence of every rational agent, that *this* or *that* man ſhould be happy? It is much better that a greater number, and beſt of all that all ſhould be ſo. But how can all men be made happy, without a conſtant regard to the rules of juſtice. Biſhop Cumberland (De Legibus Naturæ, cap. i. § 23.) not only reſolves juſtice, with the ſeveral duties annexed to it, into this principle, but even the right of ſelf-preſervation. Farther, it is altogether reaſonable, that we ſhould, or ſhould not do to another, what we would, or would not that he ſhould do unto us. Every man is agreed to think every other man unjuſt, who deprives him of any good thing which he lawfully enjoys. We ſhould therefore conſider, that others may reaſonably expect of us, whatever we may reaſonably demand from them. Moreover, all men have their rights and properties. He that is born to leaſt, is born with a right to life, liberty, and ſafety. If there be right, there muſt be juſtice: theſe mutually ſuppoſe one another. Again, whatever is enjoyed or poſſeſſed by a moral agent, independently of another, may be uſed, enjoyed, and encouraged, without being ſubject to the controul of that other; provided that the poſſeſſor has not alienated or forfeited his right; and that he uſes it not to the prejudice of any other perſon. Upon this principle is founded the natural equality of mankind, that is, an equality of right. This equality ſubſiſts in all the eſſentials of being and happineſs, under all the changes of condition to which every man is liable. Let a man's condition be what it will, high or low, rich or poor, a prince or a ſubject, as he has an equal right to what he lawfully poſſeſſes, with that which any other man can have; ſo there are certain poſſeſſions, the right of which he cannot transfer to another; of which number are life, limbs, and liberty, both civil and religious: in all which reſpects, therefore, the meaneſt perſon, while innocent, is equal to the greateſt among men. Mr. Hobbes indeed (De Cive, l. i. c. 1. § 3.) proves the equality of mankind from the equal power they have of doing miſchief. M. Barbeyrac obſerves, that this equality may be called an equality purely phyſical; whereas it is a moral equality, or an equality of right, that muſt be laid as the foundation of juſtice. Puffendorf deduces this equality of mankind from the ſameneſs of nature; which ſeems to make it, as well as that of Mr. Hobbes, a phyſical equality. Of Mr. Godwin's ſentiments concerning the ſubject under preſent diſcuſſion, we ſhall probably have occaſion to give ſome account under the articles POLITICS, SOCIETY, and VIRTUE.

Having briefly ſtated the great principles of juſtice, we ſhall now proceed to the diviſion of it. According to Ariſtotle, juſtice is *univerſal* or *particular*. *Univerſal* juſtice conſiſts in the obſervance of the laws, which extend to all the actions of mankind capable of good or evil, and thus comprehends all the virtues. Hence aroſe the common ſaying, "Εν δε δικαιοσυνη συλληβδην πασ᾽ Αρετη εστι," that is, all virtue is included in righteouſneſs. *Particular* juſtice reſpects the *rights* of other men, and conſiſts in the obſervance of equality, or in challenging no more than our own; and in giving to others what is theirs. Particular, or ſimple juſtice is either *diſtributive* or *commutative*. *Diſtributive* juſtice is concerned in the diſtribution of honour, money, or whatever elſe is to be divided among the members of a ſociety, for in all theſe there is room for equality or inequality; and therefore to diſtribute as we ought is a part of juſtice. In other words, it is concerned in matters of government, and of beneficence; and is either remuneratory, or punitive: it obſerves an equality in dealing rewards and puniſhments, according to each man's condition and merit; for as actions are either good or evil, for the good, rewards muſt be aſſigned; and for the evil, puniſhments; and herein a geometrical proportion is obſerved. *Commutative* juſtice ſuperintends the management and diſpoſal of ſuch things as enter into compacts and agreements; or it is converſant in matters of commerce, and in the equal commutation, or changing, of things; and proceeds according to arithmetical equality, without any regard to perſons and circumſtances. To which we may add *legal* juſtice, that which reſides in the ſtate, or monarch, by whoſe power and authority the effects of commutative and diſtributive juſtice are frequently ſuperſeded, or ſuſpended; as in a dearth of corn, if a perſon that has a ſtock by him will not ſell it, it ſhall be taken from him; and the like.

Dr. More diſtributes juſtice into *ethical, economical,* and *political;* the firſt conſiders all mankind as on a level; the ſecond regards them as aſſociated into families under the ſeveral relations of huſband and wife, parents and children, maſters and ſervants; and the third comprehends them as united into public ſtates, and obliged to certain duties, either as magiſtrates or people.

The precepts of juſtice, ſays the civil law, are theſe, *viz.* "honeſté vivere, alterum non lædere, ſuum cuique tribuere;" that is, to live honeſtly, to injure no one, and to render to all their due. The two laſt precepts belong to ſtrict juſtice, and theſe may accordingly furniſh a diſtinction of juſtice into *negative* and *poſitive*. *Negative* juſtice denotes every man's right to exemption from injurious actions; and *poſitive* juſtice comprehends the performance of all thoſe actions, which by contract, or any other way, are due to him. Some diſtinguiſh between "injuſtitia" and "injuria." Injuſtice is oppoſed to juſtice in general, whether negative or poſitive; an injury to negative juſtice alone. A perſon may be injured in his mind or ſoul, his body, his name, his relations, and his eſtate. (See INJURY.) *Poſitive* juſtice is the rendering to all their dues; and things may be due by a natural or an acquired right. (See RIGHT and PROPERTY.) On the ſubject of this article, ſee Grove's Syſtem of Moral Philoſophy, vol. ii. and the authors to whom he refers.

JUSTICE, *Hand of.* See HAND.

JUSTICE, *Officers of.* See OFFICERS.

JUSTICE *Poetical.* See POETICAL.

JUSTITIAM, *Temperamentum ad.* See TEMPERAMENTUM.

JUSTICE, *Juſtitiarius,* is likewiſe an officer appointed by the king or commonwealth, to do right by way of judgment.

He is called *juſtice,* not *judge;* anciently *juſtitia,* not *juſtitiarius,* becauſe he has his authority by deputation, as delegate to the king, and not *jure magiſtratus;* ſo that he cannot depute any other in his ſtead, the juſtice of the foreſt only excepted.

Of theſe juſtices we have various kinds in England; *viz.*

JUSTICE *of the King's Bench, Chief,* is the capital juſtice of Great Britain, and is a lord by his office. His buſineſs is chiefly to hear and determine all pleas of the crown; that is, ſuch as concern offences againſt the crown, dignity, and peace of the king; as treaſons, felonies, &c.

This officer was formerly not only chief juſtice, but alſo chief baron of the exchequer, and maſter of the court of wards. He uſually ſat in the king's palace, and there executed that office, formerly performed *per comitem palatii;* he determined in that palace all the differences happening between the barons and other great men.

He had the prerogative of being vicegerent of the kingdom, whenever the king went beyond ſea, and was uſually choſen to that office out of the prime nobility; but his power was reduced by king Richard I. and king Edward I. His office is now divided, and his title changed from *capitalis Angliæ juſtitiarius,* to *capitalis juſtitiarius ad placita, coram rege tenenda,* or *capitalis juſtitiarius banci regii.* See COURT *of king's bench.*

JUSTICE *of the Common Pleas, Chief,* he who, with his aſſiſtants, hears and determines all cauſes at the common law, that is to ſay, all civil cauſes, between common perſons, as well perſonal as real; and he is alſo a lord by his office. See COURT *of Common Pleas.*

JUSTICE *of the Foreſt,* is a lord by his office, who has power and authority to determine offences committed in the king's foreſts, &c. which are not to be determined by any other court, or juſtice.

Of theſe there are two; whereof one has juriſdiction over all the foreſts on this ſide Trent, and the other beyond it.

By many ancient records, it appears to be a place of great honour and authority, and is never beſtowed but on ſome perſon of great diſtinction. The court where this juſtice ſits, is called the *juſtice ſeat of the foreſt,* held once every three years, of which 40 days' notice ought to be given, for hearing and determining all treſpaſſes within the foreſt, and all claims of franchiſes, liberties, and privileges, and all pleas and cauſes whatſoever therein ariſing. (4 Inſt. 291.) This court may fine and impriſon for offences within the foreſt (4 Inſt. 313.), it being a court of record; and therefore a writ of error lies from hence to the court of king's bench. The laſt court of juſtice ſeat of any note was that held in the reign of Charles I. before the earl of Holland. After the Reſtoration another was held, for form ſake, before the earl of Oxford; but ſince the Revolution in 1688, the foreſt laws have fallen into total diſuſe, to the great advantage of the ſubject.

This is the only juſtice who may appoint a deputy: he is alſo called *juſtice in eyre of the foreſt.*

JUSTICES *of Aſſize,* were ſuch as were wont, by ſpecial commiſſion, to be ſent into this or that county, to take aſſiſes, for the eaſe of the ſubjects.

For whereas theſe actions paſs always by jury, ſo many men might not, without great damage and charge, be brought up to London; and therefore juſtices, for this purpoſe, by commiſſions particularly authorized, were ſent down to them.

Theſe continue to paſs the circuit, by two and two, twice every year, through all England, except the four northern counties, where they go only once, diſpatching their ſeveral buſineſſes by ſeveral commiſſions; for they have one commiſſion to take aſſiſes, another to deliver gaols, and another of oyer and terminer. In London and Middleſex a court of general gaol-delivery is held eight times in the year.

All the juſtices of peace of any county wherein the aſſiſes are held, are bound by law to attend them, or elſe are liable to a fine, in order to return recognizances, &c. and to aſſiſt the judges in ſuch matters as lie within their knowledge and juriſdiction, and in which ſome of them have been probably concerned, by way of previous examination. See ASSISES and JURY.

JUSTICES *in Eyre, juſticiarii itinerantes,* or *errantes,* were thoſe who were anciently ſent with commiſſion into divers counties, to hear ſuch cauſes eſpecially as were termed *pleas of the crown;* and that for the eaſe of the ſubject, who muſt elſe have been hurried to the courts of Weſtminſter if the cauſe were too high for the county courts.

According to ſome, theſe juſtices were ſent once in ſeven years; but others will have them to have been ſent oftener. Camden ſays, they were inſtituted in the reign of king Henry II. A. D. 1184; but they appear to be of an older date.

They were ſomewhat like our juſtices of aſſiſe at this day; though for authority, and manner of proceeding, very different.

JUSTICES *of Gaol-delivery*, thoſe commiſſioned to hear and determine cauſes appertaining to ſuch as, for any offence, are caſt into priſon.

Juſtices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, treſpaſs, &c. and to order execution or reprieve; and they have power to diſcharge ſuch priſoners as upon their trials ſhall be acquitted; alſo all ſuch againſt whom on proclamation made, no evidence appears to indict; which juſtices of oyer and terminer, &c. may not do. (2 Hawk. 24, 25.) But theſe juſtices have nothing to do with any perſon, not in the cuſtody of the priſon, except in ſome ſpecial caſes; as if ſome of the accomplices to a felony may be in ſuch priſon, and ſome of them out of it, the juſtices may receive an appeal againſt thoſe who are out of the priſon as well as thoſe who are in it; which appeal after the trial of ſuch priſoners, ſhall be removed into B. R. and proceſs iſſue from them againſt the reſt. But if thoſe out of priſon be omitted in the appeal, they can never be put into any other; becauſe there can be but one appeal for one felony.

In this way the gaols are cleared, and all offenders tried, puniſhed, or delivered, twice in every year.

Their commiſſion is now turned over to the juſtices of aſſiſe. See GAOL-*delivery*.

JUSTICES *of Niſi Prius*, are now the ſame with juſtices of aſſiſe. It is a common adjournment of a cauſe in the common pleas, to put it off to ſuch a day, *Niſi prius juſtitiarii venerint ad eas partes ad capiendas aſſiſas:* from which clauſe of adjournment they are called *juſtices of niſi prius*, as well as *juſtices of aſſiſe*, on account of the writ and actions they have to deal in. See NISI *Prius*, and JURY.

JUSTICES *of Oyer and Terminer*, were juſtices deputed on ſome ſpecial occaſions to hear and determine particular cauſes.

The commiſſion of oyer and terminer is directed to certain perſons, upon any inſurrection, heinous demeanour, or treſpaſs committed, who muſt firſt enquire, by means of the grand jury or inqueſt, before they are empowered to hear and determine by the help of the petit jury. It was formerly held, that no judge or other lawyer could act in the commiſſion of oyer and terminer, or in that of gaol-delivery, within the county where he was born or inhabited; but it was thought proper by 12 Geo. II. cap. 27, to allow any man to be a juſtice of oyer and terminer and general gaol-delivery, within any county of England.

JUSTICES *of the Peace*, are perſons of intereſt and credit, appointed by the king's commiſſion to keep the peace of the county where they live.

Of theſe, ſome, for ſpecial reſpect, are made of the quorum, ſo as no buſineſs of importance may be diſpatched without the preſence, or aſſent, of them, or one of them. Now the practice is to advance almoſt all of them to that dignity, naming them all over again in the *quorum* clauſe except perhaps only ſome inconſiderable perſon for the ſake of propriety; and no exception is now allowable, for not expreſſing in the form of the warrants, &c. that the juſtice who iſſued them is of the *quorum*. Whenever any juſtice intends to act under this commiſſion, he ſues out a writ of "dedimus poteſtatem" from the clerk of the crown in chancery, empowering certain perſons therein named, to adminiſter the uſual oaths to him; which done he is at liberty to act. Every juſtice of peace hath a ſeparate power, and his office is to call before him, examine, iſſue warrants for apprehending, and commit to priſon, all thieves, murderers, wandering rogues; thoſe that hold conſpiracies, riots, and almoſt all delinquents which may occaſion the breach of the peace, and quiet of the ſubject; to commit to priſon ſuch as cannot find bail, and to ſee them brought forth in due time to trial; and bind over the proſecutors to the aſſiſes. And if they neglect to certify examinations and informations to the next gaol-delivery, or do not bind over proſecutors, they ſhall be fined. A juſtice may commit a perſon that doth a felony in his own view, without warrant; but if on the information of another, he muſt make a warrant under hand and ſeal for that purpoſe. If a complaint and oath be made before a juſtice of goods ſtolen, and the informer, ſuſpecting that they are in a particular houſe, ſhews the cauſe of his ſuſpicion, the juſtice may grant a warrant to the conſtable, &c. to ſearch in the place ſuſpected, to ſeize the goods and perſon in whoſe cuſtody they are found, and bring them before him or ſome other juſtice. The ſearch on theſe warrants ought to be in the day-time, and doors may be broke open by conſtables to take the goods. Juſtices of peace may make and perſuade an agreement in petty quarrels and breaches of the peace, where the king is not entitled to a fine, though they may not compound offences, or take money for making agreements. A juſtice hath a diſcretionary power of binding to the good behaviour, and may require a recognizance, with a great penalty, of one, for his keeping of the peace, where the party bound is a dangerous perſon, and likely to break the peace, and do much miſchief; and for default of ſureties, he may be committed to gaol. But a man giving ſecurity for keeping the peace in the king's bench or chancery, may have a *ſuperſedeas* to the juſtices in the country not to take ſecurity; and alſo by giving ſurety of the peace to any other juſtice. If one make an aſſault upon a juſtice of peace, he may apprehend the offender and commit him to gaol till he finds ſureties for the peace; and a juſtice may record a forcible entry on his own poſſeſſion: in other caſes he cannot judge in his own cauſe. Contempts againſt juſtices are puniſhable by indictment and fine at the ſeſſions. Juſtices ſhall not be regularly puniſhed for any thing done by them in ſeſſions as judges; and if a juſtice be tried for any thing done in his office, he may plead the general iſſue, and give the ſpecial matter in evidence: and if a verdict is given for him, or the plaintiff be non-ſuited, he ſhall have double coſts; and ſuch action ſhall only be laid in the county where the offence was committed. (7 Jac. cap. 5. 21 Jac. cap. 12.) But if they are guilty of any miſdemeanor in office, information lies againſt them in the king's bench, where they ſhall be puniſhed by fine and impriſonment: and all perſons who recover a verdict againſt a juſtice, for any wilful or malicious injury, are entitled to double coſts. By 24 Geo. II. cap. 44. no writ ſhall be ſued out againſt any juſtice of peace, for any thing done by him in the execution of his office, until notice in writing ſhall be delivered to him one month before the ſuing out of the ſame, containing the cauſe of action, &c. within which month he may tender amends; and if the tender be found ſufficient, he ſhall have a verdict, &c. Nor ſhall any action be brought againſt a juſtice for any thing done in the execution of his office, unleſs commenced within ſix months after the act committed.

A juſtice is to exerciſe his authority only within the county where he is appointed by his commiſſion, not in any city which is a county of itſelf, or town corporate, having their proper juſtices, &c. but in other towns and liberties he may. The power and office of juſtices terminate in ſix months after the demiſe of the crown (1 Ann. cap. 8.), by an expreſs writ of diſcharge under the great ſeal, by writ of *ſuperſedeas*, by a new commiſſion, by the acceſſion of the office of ſheriff or coroner.

If the ſame juſtice, whoſe office ceaſes on the demiſe of the crown, be put in commiſſion by the ſucceſſor, he ſhall not be obliged to ſue out a new *dedimus*, or to ſwear to his qualification afreſh (ſtat. 1 Geo. III. c. 13.); nor, by reaſon of any new commiſſion, to take the oaths more than once in the ſame reign. In caſe of a *ſuperſedeas*, the power of the juſtices may be revived again by another writ, called a *procedendo*. Formerly it was thought, that if a man was named in any commiſſion of the peace, and had afterwards a new dignity conferred upon him, that this determined his office; as he no longer anſwered the deſcription of the commiſſion; but now it is provided (ſtat. 1 Edw. VI. c. 7.), that, notwithſtanding a new title of dignity, the juſtice on whom it is conferred, ſhall ſtill continue a juſtice. For a further account of the duty of juſtices, ſee Quarter *ſeſſions*.

The original of juſtices of the peace is referred to the fourth year of Edward III. They were firſt called *conſervators*, or *wardens of the peace*, elected by the county, upon a writ directed to the ſheriff; but the power of appointing them was transferred by ſtatutes from the people to the king; and under this appellation appointed by 1 Edw. III. cap. 16. Afterwards the ſtatute of 34 Edw. III. cap. 1. gave them the power of trying felonies, and then they acquired the appellation of juſtices. They are appointed by the king's ſpecial commiſſion under the great ſeal, the form of which was ſettled by all the judges, A.D. 1590; this appoints them all, jointly and ſeverally, to keep the peace, and any two or more of them to inquire and determine felonies, and other miſdemeanors; and the king may appoint as many as he ſhall think fit in every county in England and Wales, though they are generally made at the diſcretion of the lord chancellor, by the king's leave. At firſt the number of juſtices was not above two or three in a county. (18 Edw. III. cap. 2.) Then it was provided by 34 Edw. III. cap. 1. that one lord, and three or four of the moſt worthy men in the county, with ſome learned in the law, ſhould be made juſtices in every county. The number, which gradually increaſed through the ambition of private perſons, was afterwards reſtrained firſt to ſix, and then to eight, in every county, by 12 Ric. II. cap. 10. and 14 Ric. II. cap. 11. But their number has greatly increaſed ſince their firſt inſtitution. As to their qualifications, the ſtatutes juſt cited direct them to be of the beſt reputation and moſt worthy men in the county; and the ſtat. 13 Ric. II. cap. 7. orders them to be of the moſt ſufficient knights, eſquires, and gentlemen of the law; and by 2 Hen. V. ſtat. 1. cap. 4. and ſtat. 2. cap. 1. they muſt be reſident in their ſeveral counties. And by 18 Hen. VI. cap. 11. no juſtice was to be put in commiſſion, if he had not lands to the value of 20*l. per annum.* It is now enacted by 5 Geo. II. cap. 11. that every juſtice, with ſome exceptions, ſhall have 100*l. per annum*, clear of all deductions; of which he muſt make oath by 18 Geo. II. cap. 20. And if he acts without ſuch qualification, he ſhall forfeit 100*l.* It is alſo provided by 5 Geo. II. that no practiſing attorney, ſolicitor, or proctor, ſhall be capable of acting as a juſtice of the peace

Justices *of peace within liberties*, are juſtices of the peace who have the ſame authority in cities, or other corporate towns, as the others have in counties; and their power is the ſame; only that theſe have the aſſiſe of ale and beer, wood and victuals, &c. Juſtices of cities and corporations are not within the qualification act, 5 Geo. II. cap. 18.

Justice-*ſeat.* See Justice *of the Foreſt.*

JUSTICIA, in *Botany*, ſo named by Houſton, in compliment to his countryman James Juſtice, eſq. F. R. S. a clerk of ſeſſion, ſaid by Miller to have been a great lover and encourager of gardening and botany. He publiſhed, in 1764, an 8vo. volume, called the Britiſh Gardener's Director, but, if we are not miſtaken, he derives more honour from this fine and extenſive genus, than he confers upon it.—Linn. Gen. 12. Schreb. 17. Willd. Sp. Pl. v. 1. 79. Mart. Mill. Dict. v. 2. Houſt. Rel. t. 1. Vahl. Enum. v. 1. 108. Ait. Hort. Kew. ed. 2. v. 1. 35. Brown. Prodr. Nov. Holl. v. 1. 475. Juſſ. 104. Lamarck. Illuſtr. t. 12. Gærtn. t. 54. (Adhatoda; Tourn. Inſt. t. 79. Dianthera; Linn. Gen. 13. Schreb. 17. Mart. Mill. Dict. v. 2. Juſſ. 104. Gærtn. t. 51.)—Claſs and order, *Diandria Monogynia.* Nat. Ord. *Perſonatæ*, Linn. *Acanthi*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, in five deep, acute, erect, equal, narrow ſegments. *Cor.* of one petal, ringent; tube ſwelling; limb in two very unequal lips, the upper oblong, notched, the lower in three diviſions. *Stam.* Filaments two, awl-ſhaped, hidden beneath the upper lip; anthers erect, of two cells, which are ſometimes more or leſs diſtant or unequal. *Piſt.* Germen ſuperior, turbinate; ſtyle thread-ſhaped, as long as the ſtamens, and parallel to them; ſtigma ſimple. *Peric.* Capſule oblong, obtuſe, contracted at the baſe, of two cells and two elaſtic valves, the partition contrary to, and fixed in the middle of, each valve. *Seeds* two in each cell, roundiſh, each ſubtended by a ſpinous proceſs.

Eſſ. Ch. Calyx in five deep equal ſegments. Corolla ringent; its lower lip three cleft. Capſule of two elaſtic valves and two cells; partition from the centre of each valve. Seeds two in each cell, ſubtended by ſpines.

The 14th edition of Syſt. Veg. contains but 30 ſpecies of *Juſticia*, and ſeven of *Dianthera*, which latter genus, differing only in having the two lobes of its anthers a little diſtant from each other, is now, by the agreement of all botaniſts, united to the former. Vahl, in his *Enumeratio*, has 148, including Andrews's *lucida*, v. 2. 400, Andr. Repoſ. t. 313, but excluding five ſpecies ſeparated by Vahl as a genus by themſelves, called *Elytraria*. Mr. Brown, who has paid more critical attention to this tribe than any botaniſt with whom we are acquainted, has ſeparated from *Juſticia* his own *Hypoeſtes* (ſee that article); as well as his *Nelſonia*; keeping diſtinct alſo the Linnæan *Eranthemum*, characterized by having a ſalver-ſhaped, nearly equal, corolla, which appears a very ſufficient character. He ſuggeſts that the remaining ſuppoſed *Juſticiæ* ought to be further divided, by modifications of character taken from their anthers, corolla, capſule, and even infloreſcence.

We are well aware that the generic characters above given will not apply throughout to all the plants referred to this genus by Linnæus and his followers, eſpecially what concerns the form or diviſions of the corolla. In ſome indeed the calyx has but four ſegments, inſtead of five, though even that mark, according to Mr. Brown, is not ſtrictly without exception. Willdenow, though he includes *Dianthera*, has but 89 *Juſticiæ*. Thoſe of this author, and of Vahl, which are deſcribed with a double calyx, chiefly belong to *Hypoeſtes*.—*J. pulcherrima*, Linn. Suppl. 84. Vahl. n. 26. Jacq. Ic. Rar. t. 204; with *J. ſcabra*, Vahl. n. 27; and *criſtata*, Jacq. Hort. Schoenbr. v. 3. 38. t. 320, Mr. Brown unites into a new genus, *Aphelandra*, characterized by an unequal calyx, in five deep ſegments, and four ſtamens, bearing anthers of one cell each. Theſe are very handſome ſhrubs, with denſe ſpikes of long ſcarlet flowers; all natives of South America.

Examples of what are at preſent conſidered as *Juſticiæ* are

J. coccinea. Aublet. Guian. v. 1. 10. t. 3. Sm. Ic. Pict. t. 8. Curt. Mag. t. 432.—Spikes terminal. Leaves and bracteas elliptical, acute. Upper lip of the corolla lanceolate, reflexed.—Native of Cayenne. A tall *ſhrub*, which flowers in our ſtoves in winter, but not unleſs it be of a conſiderable ſize. The *leaves* are a ſpan long. *Flowers* of a rich ſcarlet, even more ſplendid than thoſe of the *Aphelandra* juſt named, which at firſt ſight they greatly reſemble. So do alſo thoſe of *J. lucida* above-mentioned. See Curt. Mag. t. 1014.

J. nitida. Jacq. Amer. 5. Vahl. Enum. n. 45. Andr. Repoſ. t. 570.—Cluſters terminal, ſomewhat branched. Flowers whorled. Calyx ſmooth. Leaves ſtalked, lanceolate, ſomewhat elliptical, pointed at each end.—Native of the Weſt Indies. The *leaves* are ſmooth and ſhining. *Flowers* white, the under lip dotted with pink.

J. naſuta. Linn. Sp. Pl. 23. Curt. Mag. t. 325.—Leaves elliptical, entire. Flower-ſtalks axillary, forked. Upper lip of the corolla linear, very narrow.—Found in the Eaſt Indies. It thrives in our ſtoves, flowering almoſt all the year through. The *flowers* are conſpicuous for their whiteneſs, and for the great breadth of the lower lip, whoſe baſe is dotted with crimſon, while the upper is extremely narrow.

J. furcata. Jacq. Hort. Schoenbr. v. 1. 2. t. 3. Vahl. Enum. n. 89. (J. peruviana; Cavan. Ic. v. 1. 17. t. 28. Curt. Mag. t. 430.)—Downy. Axillary flowers ſeſſile and nearly ſolitary; terminal ones ternate. Leaves ovate, or ſomewhat lanceolate.—Native of Peru, from whence it was brought to Spain, and from thence by the marchioneſs of Bute to England. It increaſes plentifully by ſeed in the ſtove, and is a ſhrubby plant, with copious not inelegant purpliſh *flowers*, whoſe palate is ſpeckled with white.

J. Adhatoda. Linn. Sp. Pl. 20. Curt. Mag. t. 861.—Spikes oppoſite, axillary, ſtalked. Bracteas ovate, acute, ribbed. Corolla ſomewhat cloſed.—Native of Ceylon, an old green-houſe plant in Europe, and Tournefort's original ſpecies. It is commonly called the Malabar nut, a name not very appropriate. The ſhrub is handſome and umbrageous, with large ovate *leaves*. The *flowers* are white, their palate veined with purple, which is much concealed by their cloſed or ringent form. They are but rarely produced in England.

J. orchioides. Linn. Suppl. 85. Venten. Malmais. t. 51.—Leaves ſeſſile, lanceolate. Stalks axillary, ſolitary, one or two-flowered. Corolla ſomewhat cloſed.—Native of the Cape of Good Hope. It is kept in the green-houſe at Kew, flowering in autumn. This is a rigid ſhrub, with ſmall crowded, harſh *leaves*. The *flowers*, not very unlike the laſt in form, are white with a reddiſh tinge about the palate, and grow, ſolitary or in pairs, on axillary ſtalks, longer than the leaves.

Justicia, in *Gardening*, comprizes plants of the ſhrubby and herbaceous kinds, of which the ſpecies moſtly cultivated are, chickweed-leaved juſticia (J. ſexangularis); the ſcorpion-tail Vera Cruz juſticia (J. ſcorpioides); the long-ſpiked juſticia (J. ecbolium); the Malabar nut (J. adhatoda); and the ſnap-tree (J. hyſſopifolia).

Method of Culture.—Theſe plants may be increaſed, ſome of them by ſeeds, and the others by layers and cuttings; but the latter modes are moſtly practiſed, as the ſeeds are obtained with difficulty.

Where the ſeeds are capable of being procured, they may be ſown in ſmall pots filled with light freſh earth, in the early ſpring, being plunged in a hot-bed of bark, watering the mould of the pots moderately, when it becomes dry. As they often remain long before the plants appear, the pots ſhould not be diſturbed, but be kept in the hot-bed. When the plants appear, freſh air ſhould be admitted in mild weather, and ſlight waterings given; and when they have attained a few inches in growth, they ſhould be removed into ſeparate pots filled with freſh earth, re-plunging them in the hot-bed, watering and ſhading them till they have taken freſh root; air being then freely admitted, and as the ſeaſon grows warm, due waterings being given. As they advance in growth, they ſhould be placed in larger pots, taking care not to overpot them, keeping them conſtantly in the hot-bed.

The layers ſhould be laid down in the early ſpring, in pots filled with light earth, a little water being given at the time.

The cuttings may be made from the young ſhoots, and planted in pots filled with the ſame ſort of earth, in the later ſpring or ſummer months, giving them a little water, and plunging them in the hot-bed of bark in the ſtove, due ſhade being given.

When the plants have become perfectly rooted, they may be taken off, or removed into ſeparate pots, keeping them conſtantly in the ſtove or green-houſe, according as they are more or leſs hardy. The two firſt ſorts are the moſt hardy; the others ſucceeding beſt in the hot-houſe or ſtove.

The two firſt afford ornament and variety among the other potted plants of the leſs tender ſorts, and the other among thoſe of the ſtove kinds.

JUSTICIAR, in our *Old Laws*, an officer inſtituted by William the Conqueror, as the chief officer of ſtate, and who principally determined all pleas civil and criminal. He was called in Latin *capitalis juſticiarius totius Angliæ.* See Justice.

JUSTICIARII, in *Church Hiſtory*, an appellation given to heretics who boaſt much of perfect righteouſneſs, and deſpiſe others; ſuch were the Phariſees among the Jews, and the Novatians and Donatiſts among the Chriſtians.

JUSTICIARIUS, Magister, a judge in the kingdom of Naples, who has ſupreme juriſdiction in all caſes of treaſon, and pleas of the crown, and finally determines all appeals. He has four aſſeſſors.

JUSTICIARY Court, in Scotland. The court of juſticiary has ſupreme juriſdiction in all criminal cauſes. It came in place of that of *juſtice-eyre*, or *juſtice-general*, which was laſt in the perſon of the earl of Argyle, who tranſacted for it with king Charles I. and was made juſtice-general of all the iſlands; which raiſing great debates between him and ſome hereditary ſheriffs there, the juriſdiction was taken away in 1672, and this court of juſticiary erected inſtead of it, conſiſting of a juſtice-general, alterable at the king's pleaſure; a juſtice-clerk and five other judges, who are likewiſe lords of the ſeſſion.

This court commonly ſits on Mondays, and has an ordinary clerk, who has his commiſſion from the juſtice-clerk. They have four ordinary macers and a doomſter appointed by the lords of ſeſſion.

The form of proceſs is this; the clerk raiſes a libel or indictment, by a bill paſſed by any of the lords of that court, at the inſtance of the purſuer againſt the defender or criminal, who is committed to priſon immediately after citation. When the party, witneſſes, and great aſſiſe, or jury of forty-five men, are cited, the day of appearance being come, fifteen of the great aſſiſe are choſen to be the aſſiſe upon the pannel, or priſoner at the bar. The aſſiſe ſits with the judges to hear the libel read, witneſſes examined, and the debates on both ſides, which is written verbatim in the adjournal books. The king's advocate pleads for the purſuer, being the king's cauſe, and other advocates for the panel. The debates being cloſed, the judges find the libel or indictment either *not relevant;* in which caſe they deſert the diet, and aſſoil or abſolve the party accuſed; or elſe they find the libel *relevant;* in which caſe the aſſiſe or jury of fifteen is removed into a cloſe room, none being allowed to be preſent with them; where they chooſe their own chancellor and clerk, and conſider the libel, depoſitions, and debates, and bring in their verdict of the panel ſealed, guilty or not guilty. If not guilty, the lords abſolve; if guilty they condemn, and order the ſentence of condemnation to be pronounced againſt the criminal by the mouth of the doomſter. It has been ſtrenuouſly maintained by ſome, and as ſtrenuouſly controverted by others, that an appeal lies from this court to the houſe of lords. The lords of juſticiary likewiſe go circuits twice a year, *viz.* in May and October, into the country, which is divided into three circuits, the ſouth-weſt, and north, where aſſiſes are held, and criminals tried, as mentioned above.

JUSTICIES, in *Law*, a writ directed to the ſheriff in ſome ſpecial caſes, by virtue of which he may hold plea of debt in his county-court for a large ſum; whereas otherwiſe, by his ordinary power, he is limited to ſums under forty ſhillings. The freeholders of the county are the real judges in this court, and the ſheriff is the miniſterial officer.

JUSTIFIABLE Homicide. See Homicide.

JUSTIFICATION, in *Law*, a ſpecial plea in bar, which ſignifies a maintaining or ſhewing a ſufficient reaſon in court, why the defendant did what he is called to anſwer. Pleas in juſtification muſt ſet forth ſome ſpecial matter: thus, on being ſued for a treſpaſs, a perſon may juſtify it by proving that the land is his own freehold; that he entered a houſe in order to apprehend a felon; or by virtue of a warrant, to levy a forfeiture, or in order to take a diſtreſs; in an aſſault, that he did it out of neceſſity; and, in an action of ſlander, that the plaintiff is really as bad a man as the defendant ſaid he was.

Justification, or *Juſtifying*, among *Letter Founders*. See *Letter* Foundery.

Among *Printers*, it denotes the proper adjuſtment of the lines and pages.

Justification, in *Theology*, that act of grace which renders a man juſt or righteous in the ſight of God, and places him in a ſtate of ſalvation.

The Romaniſts and reformed are extremely divided about the doctrine of juſtification; the latter contending for juſtification by faith alone, and the former by good works.

In the 11th article of the church of England it is declared that "We are accounted righteous before God, only for the merit of our Lord and Saviour Jeſus Chriſt, by faith, &c." By the faith, which in ſeveral paſſages of ſcripture is ſaid to juſtify and ſave, ſays a commentator on the thirty-nine articles (ſee Elem. of Chriſtian Theology, by the lord biſhop of Lincoln) we are to underſtand that lively "faith which worketh by love;" which purifieth the heart, and which keepeth the commandments of God: But though by theſe acts of obedience we demonſtrate that we truly and firmly believe the divine authority of Chriſt and his doctrines, yet this faith is not ſo meritorious in its own nature as to entitle us to the reward of eternal life: it juſtifies us only by being the condition upon which it has pleaſed our Almighty Father to offer us ſalvation. Our juſtification is not to be attributed to the inherent efficacy of faith, but to the mercy of God, and merits of Chriſt, from which that efficacy is derived. On the contrary, the Papiſts aſſert, that men's inherent righteouſneſs is the meritorious cauſe of their juſtification, and that good works "ad vitam æternam conſequendam veré promereri." (Cave. Trid. de Bon. Op. c. 12.) Some other divines maintain, that as, on the one hand, our ſins were imputed to Chriſt, ſo on the other, we are juſtified by the imputation of Chriſt's righteouſneſs to us; *i. e.* we, though guilty, on complying with the goſpel, are finally treated by God as righteous perſons (*i. e.* as if we had never offended him at all, or had ourſelves ſatisfied the demands of his law for ſuch offences), out of regard to what Chriſt has done or ſuffered, whereas we ſhould not otherwiſe have been ſo treated. Others again, who diſapprove both the term imputation and the ſentiment which it implies, repreſent faith in Chriſt and the goſpel as the principle or ſpring of thoſe virtues or of that character which renders men fit objects of mercy, and of thoſe promiſes of pardon, favour, and eternal life, which flow originally from the grace of God, and which are communicated to mankind by the mediation of Jeſus Chriſt. For the manner in which the doctrines of St. Paul and of St. James, with regard to juſtification, are rendered conſiſtent with each other, ſee the article Faith. Dr. Whitby repreſents faith as conſiſting merely in an aſſent to the goſpel as true; and ſays, that upon declaring that aſſent, a man was juſtified from all paſt ſins, without good works; but that good works were neceſſary in order to *continue* in a juſtified ſtate. A notion much reſembling this has been advanced and largely illuſtrated by Dr. Taylor, in his "Key to the Apoſtolical Writings," prefixed to his Commentary on the epiſtle to the Romans, and included in a "Collection of Tracts," publiſhed by Dr. Watſon, biſhop of Landaff, for the uſe of ſtudents in the univerſities, and the younger clergy. (See Faith.) This learned divine endeavours to eſtabliſh a "double juſtification," or ſalvation, for which, he thinks, we have the cleareſt ſcriptural evidence. The *firſt*, or fundamental juſtification, relates to the heathen ſtate of us gentile Chriſtians, and conſiſts in the remiſſion of ſins, and in our being admitted, upon our faith, into the kingdom and covenant of God; when, with regard to our gentile ſtate, we were obnoxious to wrath, and deſerving of condemnation. This is of "free grace, without works." For how wicked ſoever any Heathen had been, or *now* has been, upon profeſſion of faith in Chriſt, his former wickedneſs neither was, nor is, any bar to his admittance into the kingdom of God, nor to an intereſt in its privileges and bleſſings. Nay further, our preſent common ſalvation, or juſtification, is ſo of grace, and reaches ſo far, that in caſe any profeſſed Chriſtian has lived diſagreeably to the rules of the goſpel; yet, upon his repentance and return to God, his intereſt in the divine grace and the pardon of ſin ſtands good, notwithſtanding his former evil life. This our author calls the "firſt juſtification," or ſalvation, by which we are inveſted in all the preſent privileges of the goſpel; and in reference to which we are ſaid in ſcripture to be *called, elected, ſaved, juſtified, waſhed, ſanctified, born again, born of God,* &c. The firſt juſtification, however, does not terminate in itſelf, but is in order to another, which we may call "*final* juſtification," or ſalvation. This relates to, and ſuppoſes, our Chriſtian ſtate; and conſiſts in our being actually qualified for, and being put in poſſeſſion of, eternal life, after we have duly improved our *firſt* juſtification, or our Chriſtian privileges, by patient continuance in well-doing, to the end, under all trials and temptation. By works, ſays our author, excluded by St. Paul from juſtification or ſalvation, he doth not mean any *ceremonial* works, or *ritual* obſervances of the Moſaic conſtitution (ſee Titus, iii. 5.) ; but all acts of obedience properly *moral*. Moreover, by *works*, or *works of law*, excluded from juſtification, the apoſtle doth not always mean only ſinleſs, perfect obedience. The *works* excluded from juſtification are any kind of obedience, perfect or imperfect, which may be ſuppoſed a reaſon for God's beſtowing the privileges and honours of the goſpel upon the heathen world. Thoſe privileges and honours were beſtowed out of pure mercy and goodneſs, without regard to the foregoing good or bad works of the heathen world. The *works*, which are excluded from juſtification, refer to the prior ſtate of Chriſtians, and to their *firſt* juſtification ; when they were taken into the church or kingdom of God, and had their *paſt ſins* forgiven them. This *firſt* juſtification was not of works, it was of mere grace, according to the counſel and purpoſe of God's own will, without regard to what the Heathen had been before his converſion. But after converſion, when a man is become a Chriſtian, and with regard to *final* juſtification, works are expreſsly required. Nevertheleſs, works of righteouſneſs are ſo inſiſted upon in our Chriſtian ſtate, now that we are taken into the kingdom of God, that if any Chriſtian ſhould neglect the performance of them, there is ſtill room, in *this life*, for repentance. For our Lord and his apoſtles not only called men to repentance, in order to their *firſt* juſtification ; but the apoſtles, and our lord after his aſcenſion, exhort wicked Chriſtians, ſuch as were members of the goſpel church, to repentance, in order to their *final* juſtification. 2 Cor. xii. 21. Rev. ii. 5, 16. iii. 3, 19.

JUSTIFYING Bail, in *Law*. See Bail *above*.

Justifying *Grace*. See Grace.

JUSTIN I., in *Biography*, emperor of the Eaſt, a native of Dacia, was born about the year 450, and was brought up to the mean occupation of keeping of cattle. Poſſeſſing a ſtrength and ſtature which he thought were likely to recommend him, he left the buſineſs of a paſtoral life, and obtained a place among the guards of the emperor Leo. He roſe by degrees in the ſervice, till at length, in 518, he poſſeſſed, at the death of Anaſtaſius, the important office of præfect-prætorio ; and by the application of timely bribes, he ſtepped on to the vacant throne, and apparently with the unanimous conſent of the military, the clergy, and the people. The eunuch Amantius, who would gladly have raiſed one of his own friends to the high office, was, for a real or pretended conſpiracy, with ſome of his aſſociates, puniſhed with exile or death. The Gothic chief Vitalian, who had revolted againſt Anaſtaſius, and remained at the head of a powerful army, was decoyed into the palace, and aſſaſſinated at a royal banquet. Juſtin, to whom the epithet of *elder* is given, to diſtinguiſh him from another emperor of the ſame name and family, was ſixty-eight years of age when he was inveſted with the imperial purple ; and though without any advantages of education, he was preſerved from expoſing his incapacity, by his good ſenſe in following the direction of able ſtateſmen, whom he had the diſcernment to ſelect, and the wiſdom to confide in. At this time, ſays the hiſtorian, the world beheld two contemporary monarchs, Theodoric and himſelf, who were even deſtitute of the knowledge of the alphabet ; but the commanding genius of the Goth rendered him reſpectable amidſt all his ignorance ; and Juſtin, conſcious of his deficiencies, relied on the diligence of his queſtor Proclus, and the talents of his nephew Juſtinian, whom the emperor had brought from the ſolitudes of Dacia, and educated as his future heir. The chief events of this reign were the perſecution of the Arians, advances towards a reconciliation with the Roman ſee, and the commencement of a war with the king of Perſia. He aſſociated Juſtinian as his colleague in the empire in 527, and ſoon after died, in the ninth year of his reign. An earthquake, which almoſt ruined Antioch and ſeveral other cities in the Eaſt, was a calamity which greatly affected the emperor. He is ſaid to have laid aſide the imperial robes, clothed himſelf in ſackcloth, and paſſed ſeveral days in faſting and prayer, to avoid the divine judgments. His piety was not ſurpaſſed by his humanity ; and he diſplayed much benevolence in relieving thoſe who had ſuffered by and ſurvived the terrible diſaſter. Gibbon. Univer. Hiſt.

Justin II., emperor of the Eaſt, nephew and ſucceſſor of Juſtinian, aſcended the throne in 565. The choice of the ſenate and people was ſanctified by the benediction of the patriarch, who placed the diadem on his head, which was the firſt time the ceremony had been performed by a prieſt. As his predeceſſor had given great offence by aboliſhing the office of conſul, the new emperor reſtored it in his own perſon, almoſt as ſoon as he came to the throne. On this occaſion, he diſtributed large ſums of money among the people, and immediately diſcharged the debts, and corrected the abuſes of his late uncle. The popularity acquired by this commencement of Juſtin's reign was ſoon forfeited by inſtances of cruelty and avarice, which were imputed to the inſtigation of the empreſs Sophia. He cauſed his relation Juſtin, who had a military command on the banks of the Danube, to be ſtrangled ; and he put to death ſome of his ſenators, from a ſuſpicion of their being diſaffected. He made war againſt Perſia ; but being defeated at the head of a numerous army, he was obliged to ſue for peace. Soon after this, Juſtin was ſeized with a diſorder, which affected his intellects, and rendered him incapable of government. By the advice of his empreſs, he raiſed to the rank of Cæſar, in the year 574, a Thracian named Tiberius, who had obtained, by his abilities, the office of poſt-captain of the guards. The ceremony of his elevation was performed in the portico of the palace, in the preſence of the patriarch and the ſenate. On this occaſion Juſtin made a long ſpeech, which his flatterers imputed to divine inſpiration, in which he recommended his ſucceſſor to love his people as himſelf ; to cultivate the affections, and maintain the diſcipline of the army ; to protect the fortunes of the rich, and to relieve the neceſſities of the poor : and he concluded with a prayer, that the God of heaven and earth would infuſe into his heart to do whatever he himſelf had neglected or forgotten. The four laſt years of his life were ſpent in retirement ; and his choice was juſtified by the filial reverence and gratitude of Tiberius. Juſtin died October 5th, 578.

Justin, a Latin hiſtorian, is ſuppoſed to have flouriſhed in the ſecond century, under Antoninus Pius. His hiſtory, which is uſed in our ſchools as an elegant compendium for young people, is an abridgment of that of Trogus Pompeius, in forty-four books, which has been long loſt. The narration of Juſtin is clear, his reflections are ſenſible, though obvious, and his ſtyle is ſometimes eloquent. The hiſtory comprehends what relates to the Aſſyrian, Perſian, Grecian, Macedonian, and Roman empires. The beſt editions are thoſe by Gronovius, Hearne, and Barbou. The Delphin edition is much in uſe.

Justin, *St.*, in *Geography*, a town of France, in the department of the Landes ; 27 miles W. of Condom.

JUSTINGEN, a town and capital of a lordſhip, purchaſed in 1751 by the duke of Wirtemberg ; 16 miles N.N.E. of Buchau.

JUSTINIAN I., in *Biography*, emperor of the Eaſt, was born of an obſcure race in Dacia, whence, as we have ſeen in the article JUSTIN I., he was brought, and educated with a view of ſucceeding to the empire. Juſtinian was, during the life of his uncle, made partner in the imperial throne; and upon the death of Juſtin, became its ſole poſſeſſor, being at that period, A.D. 527, in the forty-fifth year of his age. Immediately upon his elevation, he ſolemnly eſpouſed Theodora, an actreſs, who in early youth had followed a courſe of proſtitution, and who gained ſo complete an aſcendancy over the mind of the emperor, as to be aſſociated with him on the throne. He began his reign by a violent perſecution of heretics and ſectaries, and he regarded himſelf as a great theologian. His reign was, however, memorable for many important tranſactions, military and civil; and he carried his arms with ſucceſs againſt his enemies, for which he was chiefly indebted to Beliſarius his great general, who alſo preſerved him from a formidable conſpiracy. (See the article BELISARIUS.) The legiſlative labours of Juſtinian are what have conferred the chief celebrity on his name. The reformation of the Roman juriſprudence occupied the attention of the emperor from his firſt poſſeſſion of the ſupreme power. The perſon to whom he principally confided this arduous taſk was Tribonian, an eminent lawyer of various and extenſive attainments. By his cares, and thoſe of nine perſons aſſociated with him, the new code of Juſtinian was completed in the year 529. This publication was followed in 533 by that of the Pandects or Digeſt, a compilation of the deciſions and opinions of former civilians; and of the Inſtitutes, an elementary treatiſe of the Roman law for the uſe of ſtudents. A new edition of the Code, in 534, made a conſiderable addition to the emperor's own laws; and his Edicts and Novels complete the vaſt edifice of juriſprudence, reared by the legiſlative ſpirit which diſtinguiſhed his reign. Another remarkable trait in this emperor's character was his paſſion for building. His piety was diſplayed in numerous churches, and other buildings dedicated to religion, of which the celebrated church of Sancta Sophia at Conſtantinople, now ſubſiſting as the principal moſque of the Turkiſh empire, atteſts the magnificence of his deſigns. Bridges, aqueducts, high-roads, and hoſpitals, were among his works of public utility, by which every province of the empire was benefited. His works of peace were frequently interrupted by wars, which agitated the empire during almoſt the whole of this reign; but in 558, a peace upon honourable terms put an end to the long conteſts between the Roman and Perſian empires. The rejoicings on this event were diſturbed by a dreadful earthquake, which overthrew many ſtately edifices, with a great loſs of lives. Juſtinian, broken down with cares and old age, died in November 565, in the thirty-ninth year of his reign, and the eighty-third of his age. Among other diſtinguiſhed events of this reign, the introduction of the ſilk-worm into the Greek empire, by means of two Perſian monks, who went as miſſionaries to China, ought not to be omitted. The increaſing jealouſies, and the heavy burdens which Juſtinian impoſed upon his ſubjects, had, ſome time before his death, deſtroyed all attachment to his perſon; and he who, in many reſpects, deſerved the title of the laſt Roman emperor, left the ſtage unlamented and unhonoured. Gibbon. Univer. Hiſt.

JUSTINIAN II., emperor of the Eaſt, ſucceeded his father Conſtantine Pogonatus in 685, being then only ſixteen years of age. He was naturally of a violent temper; and his love of war induced him to break a treaty which he had made with the Saracens, and renew hoſtilities againſt them. He recovered ſeveral provinces from his enemies, and made an extravagant peace with them; but his exactions, cruelties, and debaucheries, tarniſhed the glory of his arms, and rendered him an object of hatred to all. He formed a deſign of deſtroying all the inhabitants of Conſtantinople: but Leontius, a celebrated commander, attempted the deliverance of his country. He was ſucceſsful; dethroned the emperor, and ſeized him and his miniſters without reſiſtance. Juſtinian's life was ſpared, but he was ſentenced to be baniſhed, and to ſuffer the amputation of his noſe: hence he was named by the Greeks "Rhinotmetus." In 704 he, by the aſſiſtance of the Bulgarians, regained his ſeat, when he revenged himſelf upon his enemies. The firſt victims were Leontius and Tiberius, who had ſucceſſively filled the throne during the interval of his baniſhment. Theſe were dragged in triumph through the city, and then placed in chains beneath his throne, whence he beheld the ſpectacles, with a foot upon each of their necks, whilſt the inconſtant people ſhouted, "Thou ſhalt trample on the aſp and baſiliſk." They were then led to execution. So many perſons were, on this occaſion, the victims of his fury, that it is ſaid whole provinces were almoſt depopulated by the multitude of his executions. Juſtinian died by the hands of aſſaſſins in 711; and ſuch was the hatred which he had every where inſpired, that his young ſon Tiberius, whom his grandmother had placed in a ſanctuary, was dragged from the altar, and murdered before her eyes. Thus the race of Heraclius was extinguiſhed, after a reign of one hundred years. Univer. Hiſt. Gibbon.

JUSTIZA, a magiſtrate of Arragon, whoſe office bore ſome reſemblance to that of the ephori in ancient Sparta. He acted as the guardian of the people, and the comptroller of the prince. His perſon was ſacred, and his juriſdiction unbounded. He was the ſupreme interpreter of the laws. Not only inferior judges, but the kings themſelves, were bound to conſult him in every doubtful caſe, and to receive his reſponſes with implicit deference. An appeal lay to him from the royal judges, as well as from thoſe appointed by the barons within their reſpective territories. Even when no appeal was made to him, he could interpoſe by his own authority, prohibit the ordinary judge to proceed, take immediate cognizance of the cauſe himſelf, and remove the party accuſed to the "Manifeſtation," or priſon of the ſtate, to which no perſon had acceſs but by his permiſſion. His power was exerted with no leſs vigour and effect in ſuperintending the adminiſtration of government, than in regulating the courſe of juſtice. It was his prerogative to inſpect the conduct of the king, to review all the royal proclamations and patents, and to declare whether or not they were agreeable to the law, and fit to be executed. He, by his ſole authority, could exclude any of the king's miniſters from the conduct of affairs, and call them to anſwer for their mal-adminiſtration. The juſtiza himſelf was accountable only to the Cortes for the execution of his high office. By a law enacted in the Cortes, A.D. 1442, it was ordained that the juſtiza ſhould continue in office during life, and ſhould not be removed from it, unleſs by the authority of the Cortes. This officer was appointed by the king; but to prevent his becoming a dependent and tool of the crown, inſtead of the guardian of the people, it was determined that he ſhould retain his office during life. He was ſelected from perſons of the ſecond claſs, or cavalleros, anſwering nearly to gentlemen or commoners in Great Britain, and not from the ricoſhombres or noblemen, that he might check the domineering and oppreſſive ſpirit of the nobles, as well as ſet bounds to the power of the monarch; and that he himſelf might be accountable for the manner in which he executed his truſt, and liable to rigorous puniſhment: whereas the ricoſhombres were not ſubject to capital puniſhment. For contracting his power, ſeventeen perſons were choſen by lot in each meeting of the Cortes; and theſe formed a tribunal, called the court of inquiſition into the office of juſtiza. This court met at three ſtated times in the year; and to this court the juſtiza and his deputies were reſponſible for their conduct. The members of the court paſſed ſentence by ballot; and they might puniſh by degradation, confiſcation of goods, or even with death. The law which erected this court, and regulated the forms of its precedence, was enacted A.D. 1461. Robertſon's Hiſt. of Charles V., vol. i.

JUSTNESS, the exactneſs or regularity of any thing.

Juſtneſs is chiefly uſed in ſpeaking of thought, language, and ſentiments. The juſtneſs of a thought conſiſts in a certain preciſion or accuracy, by which every part of it is perfectly true, and pertinent to the ſubject.

Juſtneſs of language conſiſts in uſing proper and well choſen terms; in not ſaying either too much, or too little.

M. De Mere, who has written on juſtneſs of mind, diſtinguiſhes two kinds of juſtneſs; the one ariſing from taſte and genius; the other from good ſenſe, or right reaſon. There are no certain rules to be laid down for the former, *viz.* to ſhew the beauty and exactneſs in the turn, or choice of a thought; the latter conſiſts in the juſt relation which things have to one another.

JUTE, in *Manufactures*, is a remarkably ſtrong vegetable fibre, the produce of the Eaſt Indies, which Dr. William Roxburgh has fully deſcribed, and its uſes, in the Tranſactions of the Society of Arts, vol. xxii. p. 372.

JUTERBOCK, in *Geography*, a town of Germany, in the principality of Querfurt, with two fauxbourgs, ſituated on the Angerbach; 16 miles N. E. of Wittenburg. N. lat. 52°. E. long. 13° 2′.

JUTES, in *Ancient Hiſtory*, a tribe of the Getæ, the conquerors of ſo many countries, inhabited the extremity of the Cimbric Cherſoneſus, which from them is ſtill called *Jutland;* which ſee.

JUTHIA, Odia, or *Siam*, in *Geography*, a town of Aſia, capital of the kingdom of Siam, and reſidence of the king, ſituated on a large iſland in the river Menan, at the diſtance of ſome leagues from the ſea. The royal palace is large and beautiful, and the pagodas are numerous. The Dutch have a factory here, and many merchants from different countries come to trade. In 1766, this town was taken by the Birmans. N. lat. 14° 18′. E. long. 100° 52′.

JUTLAND, a peninſula of Europe, in the kingdom of Denmark, formerly called "Cimbria," and the "Cherſoneſus Cimbricus," bounded on the E. by the Scaggerak, the Little Belt, and the Baltic; on the S. by the duchy of Holſtein, and on the W. and N. by the Northern ſea; about 200 miles long, and 95 broad. It is generally divided into North Jutland, more eſpecially called Jutland, and South Jutland, more generally called the "duchy of Sleſwick;" which ſee.

Jutland, or *North Jutland*, is bounded on all ſides by the ſea, except towards the ſouth, where its boundary is the duchy of Sleſwick; it is about 150 miles long, and from 60 to 80 broad. Of all the territories belonging to Denmark, it is the largeſt and yields the greateſt revenue. The middle part conſiſts of heaths and moors, intermixed with few ſpots of arable land; but theſe afford good paſture for oxen, ſheep, and goats. The other parts, of greater extent, are very fertile, and yield a great quantity of grain, which is annually exported to Sweden, Norway, and Holland. The inhabitants derive alſo conſiderable ſums from their oxen, horſes, and hogs. Hence Jutland is commonly called "the land of bacon and rye bread." This country is alſo plentifully ſupplied with all kinds of freſh water and ſea fiſh. On the eaſt ſide it has fine woods of oak, beech, fir, &c. but on the weſt ſide the inhabitants are obliged to uſe heath and turf for fuel. Jutland abounds with game. The air is keen and cold, eſpecially towards the North ſea. The inhabitants are vigorous, robuſt, and reſolute; and ſeem to have gained a greater degree of freedom than the other inhabitants of Denmark. Many of the Jutlanders have freeholds, for which they pay a ſmall acknowledgment to the lord of the manor and the public taxes. The Daniſh language is ſpoken in Jutland with a particular accent, and with leſs purity than in the other provinces. The only place in which the exerciſe of any religion, beſides Lutheraniſm, is tolerated, is Fredericia. North Jutland is compoſed of four dioceſes, or governments; each of which has its biſhop and general-governor; and they derive their names from thoſe of their chief cities, *viz.* Aalborg, Wiborg, Arrhuus, and Ripen. The population of theſe four dioceſes is ſtated by Mr. Coxe at 358,136 perſons. Jutland ſupplies tripoly and fuller's earth, beſides ſome alum and vitriol.

JUTRAM, a town of Hindooſtan, in Guzerat, on the gulf of Cambay; 16 miles N.W. of Amood.

JUTTARA, a town of Hindooſtan, in the circar of Cicacole; 10 miles N. of Viſigapatam.

JUTTY Head. See Jetty *Head.*

JUTWAR, in *Geography*, a ſmall circar of Hindooſtan, in Guzerat, on the left bank of the Puddar, a little above the gulf of Cutch; about 25 miles long, and 16 broad.

JUVANTIA, in *Medicine*, literally ſignifying *aiding* things, and generally contraſted with *lædentia*, or *hurtful* things, is a term applicable to every agent or circumſtance which contributes to alleviate a diſeaſe, as the word *lædentia* ſignifies every thing which can increaſe the ſymptoms of a diſorder, or prevent its progreſs towards amendment; but the terms are principally uſed to denote thoſe things, which poſſeſs a minor degree of influence on the animal economy, and cannot be claſſed among the actual remedies or cauſes of diſeaſe. Whence the common precept of medical writers, to attend to the *juvantia* and *lædentia*, at the ſame time that the active remedies for any diſeaſe are employed.

JUVELSKOI, in *Geography*, a town of Ruſſia, in the government of Tobolſk. N. lat. 63° 40′. E. long. 61° 14′.

JUVENAL, Decius Junius Juvenalis, in *Biography*, a celebrated Roman poet, who was born at Aquinum, in Italy. He came early to Rome, and paſſed much of his life in the purſuits of the bar, after which he applied himſelf to write ſatires, ſixteen of which are ſtill extant, and very highly prized. They ſtand pre-eminent in the claſs of thoſe which employ warm ſerious invective, and make vice rather than folly their object. He wrote with acrimony againſt all his adverſaries: he is far more correct than his contemporaries, which has been attributed to his judgment and experience, being far advanced in life when he wrote his ſatires. He appears to have been a lover of virtue, though his language and deſcriptions are ſometimes very groſs: many of his maxims of morality are delivered with great force and dignity; as a poet he has more animation than taſte. He has with reaſon been called the laſt of the Roman poets, for after him poetry decayed, and nothing more claims attention as a perfect poetical compoſition. The beſt editions of this poet are thoſe by Caſaubon, of Hawkey, and of Grævius cum notis variorum. The Delphin edition is much uſed, as are the Aldine and Glaſgow editions.

JUVENALIA, or Juvenales *ludi*, games, exerciſes of body, and combats, inſtituted by Nero the firſt time his beard was ſhaved.

They were celebrated in private houſes, and even the women had a ſhare in them: probably they were the ſame with what were otherwiſe called *Neroniana*.

JUVENCUS, Caius Vettius Aquilinus, in *Biography*, one of the earlieſt Chriſtian poets, was a prieſt of a noble family in Spain, and flouriſhed in the fourth century. He wrote a poem on the life of Chriſt, taken from the goſpel of St. Matthew. It was compoſed about the year 329. It has been frequently reprinted, and may be found in Mattaire's "Corpus Poetarum;" and in the "Bibliotheque des Pères." Gen. Biog.

JUVENIEC, in *Geography*, a town of Poland, in the palatinate of Wilna; 70 miles E. of Lida.

JUVENTAS, in *Mythology*, the goddeſs who preſided over youth among the Romans. This goddeſs was long honoured in the Capitol, where Servius Tullius erected her ſtatue. Near the chapel of Minerva there was the altar of Juventas, and upon this altar a picture of Proſerpine. The Greeks called the goddeſs of youth Hebe; but it has been generally ſuppoſed that this was not the ſame with the Roman Juventas.

JUVIGNY, in *Geography*, a town of France, in the department of the Channel, and chief place of a canton, in the diſtrict of Mortain; four miles N. W. of Mortain. The place contains 632, and the canton 5603 inhabitants, on a territory of 100 kiliometres, in nine communes. Alſo, a town of France, in the department of the Marne; nine miles N.W. of Chalons-ſur-Maone.—Alſo, a town of France, in the department of the Orne, and chief place of a canton, in the diſtrict of Domfront. The place contains 1945, and the canton 11,126 inhabitants, on a territory of 207½ kiliometres, in 13 communes.

IVY, in *Botany*, &c. (See HEDERA.) The ivy is a ſmall well-known creeping or climbing kind of plant. From its property of ſpreading rapidly over a ſurface, it has been recommended as proper for protecting the faces of earthen dikes, and other ſimilar fences, as by this means they are preſerved from mouldering down and being deſtroyed.

Ivy, in the *Materia Medica*. The leaves of ivy are ſeldom uſed inwardly, but outwardly they are applied to iſſues, to keep them cool, and free from inflammation, as alſo to ſcabs, ſores, and ſcald heads. Mr. Boyle, in his uſe of Experimental Philoſophy, commends a large doſe of the full ripe berries as a remedy againſt the plague; and it is ſaid, that in the London plague, the powder of them was given in vinegar, or white wine, with ſucceſs; and they have been recommended in ſmall doſes, as alexipharmic and ſudorific. Schroder ſays, they purge upward and downward. The gum of ivy is ſomewhat cauſtic, and commended to take away ſpots and freckles out of the face. This reſinous juice, exuding from the ſtalks of ivy, has been recommended as corroborant and reſolvent, in cachexies and uterine obſtructions; but has been rarely uſed, except as an ingredient in plaſters; nor does it appear to poſſeſs any virtues which common reſin has not in an equal degree.

Ivy-*reſin* is brought from Perſia, and ſome other of the hot countries, where alone it is to be found in any conſiderable quantity. Mr. Ray, indeed, mentions ſome of it having been found on ivies in Worceſterſhire, and other authors in other parts of Europe; but theſe are only ſingular inſtances of what may happen, our ſhops being obliged to be ſupplied from the Eaſt.

The ancient Greeks were acquainted with this reſin, which they called *lachryma hederæ*, as ſome alſo do to this day. It is ſaid to be emollient and detergent, and to make a noble balſam for freſh wounds; but is never uſed by us with theſe intentions. The Perſians eſteem it much as an aſtringent.

Ivy, *Ground*, in *Botany* and the *Materia Medica*. See GLECHOMA.

Ivy-*tree of America*. See KALMIA.

Ivy, *Petrified*. See PETRIFACTION.

Ivy, *Virginian*. See MOONSEED.

JUXON, William, in *Biography*, was born at Chicheſter, but received his education at Merchant Taylors' ſchool, London, from whence he was removed to St. John's college, Oxford, of which he was made a fellow in 1598, and in 1621, he was elected preſident. In 1627, he was promoted to the deanery of Worceſter, and in 1633, appointed clerk of the cloſet to the king, and in the following year he obtained, through the intereſt of archbiſhop Laud, the biſhopric of London; and ſhortly after he was appointed lord high treaſurer. This laſt promotion gave general offence. His birth and character were deemed too obſcure for a man raiſed to one of the higheſt offices of the crown; nevertheleſs, his conduct in that ſtation was irreproachable. In the rebellion he ſuffered the loſs, not only of his eccleſiaſtical revenues, but of a great part of his temporal eſtate. In 1648, he attended the king upon the ſcaffold, after which he was taken into cuſtody with a view of forcing him to reveal any ſecrets with which his majeſty had entruſted him; but his prudence, integrity, and honour, were ſuperior to every art exerciſed upon him. At the reſtoration he was made archbiſhop of Canterbury. He died in 1663, at the age of 81, and was buried in St. John's college-chapel, Oxford. He was a perſon of great integrity, mildneſs, and humanity, and endowed with an excellent underſtanding. Wood. Hume.

JUXTAPOSITION, is uſed by philoſophers to denote that ſpecies of growth, which is performed by the appoſition of new matter to the ſurface, or outſide, of old.

In which ſenſe, it ſtands oppoſed to intuſ-ſuſception; where the growth of a body is performed by the reception of a juice within it, diffuſed through its canals. See NUTRITION.

JUZCUR, in *Geography*, a town of Africa, in the kingdom of Fez, on the coaſt of the Mediterranean; 15 miles W. of Mezemba.

JUZENNECOURT, a town of France, in the department of the Upper Marne, and chief place of a canton, in the diſtrict of Chaumont; ſix miles N.W. of Chaumont The place contains 243, and the canton 6435 inhabitants, on a territory of 272½ kiliometres, in 24 communes.

IWAMI, or SEKISJU, a province of Japan.

IWANCZOWICZA, a town of Lithuania, in the palatinate of Novogrodek; 52 miles S.S.W. of Novogrodek.

IWANGROD, a town of Poland, in the palatinate of Braclaw; 60 miles E.S.E of Braclaw.

IWATA, a town of Japan, in the iſland of Niphon: 100 miles W. of Jedo.

IWETPOUR, a town of Bengal; 15 miles E. of Geragot

IWIE, a town of Lithuania, in the palatinate of Wilna; 24 miles E. of Lida.

IWNICA, a town of Poland, in the palatinate of Kiev; 60 miles W S W of Kiev.

IXIA, in *Botany*, ἰξία, the Greek name of the Miſſeltoe, or *Viſcum album*. It does not appear why Linnæus adopted it for the preſent genus.—Linn. Gen. 26. Schreb. 35. Willd. Sp. Pl. v. 1. 195. Vahl. Enum. v. 2. 40. Thunb. Diſſ. n. 8. Ait. Hort. Kew. ed. 2. v. 1. 86. Ker. in Ann of Bot. v. 1. 226. Curt. Mag. p. 1013. Mart. Mill. Dict.

v. 2.

t. 2. Juſſ. 58. Lamarck. Illuſtr. t. 31.—Claſs and order, *Triandria Monogynia.* Nat. Ord. *Enſatæ,* Linn. *Irides,* Juſſ.

Gen. Ch. *Cal.* Spatha inferior, ſhorter than the corolla, of two oblong permanent valves; the outermoſt enfolding the inner one. *Cor.* of one petal, ſuperior; tube thread-ſhaped, ſlender, erect, ſcarcely dilated upwards; limb regular, divided to its very baſe into ſix, nearly equal, ſpreading, flattiſh ſegments. *Stam.* Filaments three, inſerted into the mouth of the tube, decurrent, much ſhorter than the limb; anthers oblong, ſomewhat curved. *Piſt.* Germen roundiſh, ſomewhat triangular; ſtyle thread-ſhaped, erect; ſtigmas three, linear, recurved, ſpreading. *Peric.* Capſule roundiſh-ovate, membranous, tumid, of three cells and three valves. *Seeds* numerous, globoſe.

Eſſ. Ch. Spatha of two valves. Corolla with a ſlender tube, and regular limb. Stigmas three, narrow, recurved. Capſule ovate, ſomewhat globoſe. Seeds globoſe.

An extenſive genus of bulbous Cape plants in Linnæus, Willdenow, and Vahl, from which Mr. Ker has, generally we think very happily, ſeparated ſeveral genera, all agreeing with it in the regular corolla, by which they are all in common diſtinguiſhed from *Gladiolus* (ſee that article); but differing from it, as well as among themſelves, in other particulars. See ARISTEA, GEISSORRHIZA, and HESPERANTHA.—As we have given a view of all the certain ſpecies of *Gladiolus,* we deem it neceſſary to do the ſame by *Ixia,* of which Mr. Ker reckons up 15 ſpecies. In its old ſtate the genus ſtands in Willdenow with 47 ſpecies, and in Vahl with 56, beſides ſix reckoned by the latter doubtful, adopted from Burmann.

Section 1. *Limb leſs ſpreading, tube ſhorter, ſpatha larger, as well as more thin and membranous, than in the reſt.*

1. I. *pendula.* Thunb. Diſſ. n. 16. Linn. Suppl. 91.—Flowers ſomewhat bell-ſhaped, pendulous. Branches of the panicle capillary, drooping. Spatha longer than the tube.—Gathered at the Cape of Good Hope, in watery places, in November, by Thunberg, who deſcribes it as the talleſt and moſt ornamental of its genus, with large, pendulous, fleſh-coloured *flowers,* the ſegments of which, in his ſpecimen given to Linnæus, are above an inch long, while the tube is not half ſo much. We know no figure of this ſpecies, nor is it in the gardens.

2. I. *capillaris.* Thunb. n. 12. t. 2. f. 2. Linn. Suppl. 92. Ker in Curt. Mag. t. 570? Flowers ſomewhat bell-ſhaped. Spatha equal to the tube. Leaves linear.—Native, like all the reſt, of the Cape of Good Hope, flowering in our green-houſes chiefly in the ſpring. Mr. Ker quotes under this *I. lancea,* Jacq. Ic. Rar. t. 281. If this be right, it varies in the breadth of its *leaves,* as well as in having ſometimes only one flower on a ſtalk, ſometimes ſeveral. They are of a pale roſe or fleſh colour. The *bulb* is curiouſly reticulated.

3. I. *aulica.* Ait. Hort. Kew. ed. 1. v. 1. 57. ed. 2. v. 1. 86. (I. capillaris γ; Ker in Curt. Mag. t. 1013.)—Flowers nearly ſalver-ſhaped, crowded. Spatha half as long as the tube. Leaves oblong, many-ribbed.—Sent by Mr Maſſon to Kew garden in 1774. Mr. Ker eſteems it a variety of the preceding, but the characters we have given ſeem to diſtinguiſh it. The *flowers* are much more expanded, and larger, of a full roſe-colour, and the *leaves* very much broader.

Section 2. *Tube ſlender, conſiderably longer than the ſpatha; limb widely ſpreading.*

4. I. *ariſtata.* Thunb. Diſſ. n. 15. Ker in Curt. Mag. t. 589.—Spike ſomewhat level-topped. Spatha about one-fourth the length of the tube, ſharply toothed. Limb ſalver-ſhaped. Stamens nearly equal to the ſtyle.—The *leaves* are broad and ſword-ſhaped, with many ribs, and a cartilaginous though narrow edge. *Stem* round, ſometimes branched. *Flowers* numerous, ſomewhat corymboſe, roſe-coloured with a white orifice, inodorous, their limb quite flat. The *ſpatha* has much of the character of Mr. Ker's genus *Sparaxis.* This ſpecies requires a conſtant ſupply of water, eſpecially when about flowering.

5. I. *patens.* Ait. Hort. Kew. ed. 1. v. 1. 59. ed. 2. v. 1. 86. Ker in Curt. Mag. t. 522. Redout. Liliac. t. 140. (I. filiformis; Venten. Jard. de Cels, t. 48. Redout. Liliac. t. 30. I. ariſtata; Schneev. Ic. t. 32.)—Spike cylindrical. Tube very ſlender; limb widely ſpreading, ſomewhat reflexed. Filaments erect and cloſe together.—The *leaves* of this very handſome ſpecies are ſword-ſhaped. *Stem* ſlender, erect and rigid. *Flowers* more or leſs numerous, in a cylindrical ſpike, rarely branched, their colour a vivid crimſon or carmine, ſometimes varying to a lighter vermilion hue. The ſegments of the limb are often much reflexed, and they vary in length, but are uſually elliptical, and each near an inch long. The eye, or orifice of the tube, is often green bordered with white.

6. I. *flexuoſa.* Linn. Sp. Pl. 51. Ker in Curt. Mag. t. 624. (I. polyſtachya; Redout. Liliac. t. 126. I. capitata, var. ſtellata; Andr. Repoſ. t. 232.)—β. I. flexuoſa; Curt. Mag. t. 127.—Stem branched, racemoſe. Tube ſlender, ſlightly dilated upward; limb ſomewhat contracted, its ſegments elliptical, concave, ſpreading. Filaments cloſe together.—The *leaves* are linear, graſſy. *Stem* ſlender, not quite erect, branched for the moſt part, each branch bearing a ſhortiſh cluſter of pale roſe-coloured, moſtly ſtriped, fragrant *flowers,* half the ſize of the laſt, their orifice moſtly yellow, their ſegments not expanded into a ſalver-ſhape, each of them moreover being concave. Sometimes the flowers are of a pale or dull violet-colour.

7. I. *conica.* Saliſ. Hort. 36. Ker in Curt. Mag. t. 539. Redout. Liliac. t. 138. (I. capitata, var. fl. aurantio; Andr. Repoſ. t. 50. I. fuſco-citrina; Redout. Liliac. t. 86.)—Stem ſimple. Cluſter denſe. Limb ſpreading, twice as long as the tube. Style longer than the filaments.—The *leaves* are linear and graſſy. *Flowers* in a *thyrſus,* or denſe cluſter, as large as thoſe of I. *patens,* but leſs expanded, of a rich orange, ſometimes a lemon-colour, with a brown and yellow eye, inodorous. The *ſtyle* continues undivided above the baſe of the *anthers.*—This is one of the moſt ſplendid of the genus.

8. I. *monadelpha.* Ait. Hort. Kew. ed. 2. v. 1. 87. Ker in Curt. Mag. t. 607. (I. columnaris; Andr. Repoſ. t. 203. 211. 213. 250. Galaxiæ ixiæflora; Redout. Liliac. t. 41.)—Cluſter corymboſe. Flowers ſalver-ſhaped. Filaments united into a tube. Remarkable for its perfectly monadelphous *ſtamens.* The *leaves* are ſword-ſhaped. *Flowers* ſcentleſs, rather large, not numerous, in a ſhort corymboſe cluſter; their tube about equal in length to the limb, which is flat, uſually light blue or purple, rarely yellow, always diſtinguiſhed by a broad browniſh, or greeniſh, central ſtain, or eye.

9. I. *columellaris.* Ait. Hort. Kew. ed. 2. v. 1. 88. Ker in Curt. Mag. t. 650. (I. columnaris, var. anguſtifolia; Andr. Repoſ. t. 392.) Cluſter corymboſe. Flowers nearly ſalver-ſhaped. Filaments united at their baſe.—Differs from the laſt in the *ſtamens* being united at their baſe only, the *flowers* ſcented like woodruff or new hay, not quite ſo horizontally expanded, opening in the morning and cloſing at noon, and produced in Auguſt inſtead of the ſpring. Their colour is purpliſh, the eye richly variegated with broad circles of black and red. The *leaves* are graſſy.

10. I. *maculata.* Thunb. Diſſ. n. 19. Linn. Syſt. Veg. ed. 14. 85. Mant. 320. Ker in Curt. Mag. t. 549. 789. 1285. Andr. Repoſ. t. 196. 256. Redout. Liliac. t. 137. Jacq. Hort. Schoenbr. v. 1. 9. t. 19—23. Schneev. Ic. t. 6. 25. (I. capitata; Andr. Repoſ. t. 23. 159. I. ſpicata, var. viridi-nigra; Andr. Repoſ. t. 29.)—Flowers nearly ſalver-ſhaped; tube capillary; limb ſtained at the baſe. Stigmas ſeparate as low as the tube. This common and ornamental ſpecies, figures of which are needleſsly multiplied by authors, is known by the broad dark ſtain in the centre of the *flower*, while it differs from the two laſt in having diſtinct filaments. The colour of the *corolla* ſports in every ſhade of crimſon, pale purple, orange, yellow, even to white; though, as Mr. Ker obſerves, ſome other ſpecies may poſſibly be confounded under Jacquin's numerous varieties. The moſt remarkable variety is the green, in t. 23. of that author, Curt. Mag. t. 549, Andr. t. 29, Schneev. t. 6. The *leaves* are linear-ſword-ſhaped. *Spike* or *cluſter* oblong, various in length, ſimple and almoſt always ſolitary. *Flowers* about as large as thoſe of our 5th and 7th ſpecies, their tube very ſlender, ſhorter than the limb, which is a little concave. *Style* encloſed in the tube; ſtigmas projecting.

11. I. *erecta.* Thunb. Diſſ. n. 18. Ker in Curt. Mag. t. 623. 1173. Jacq. Hort. Schoenbr. v. 1. 9. t. 18. (I. polyſtachia; Linn. Sp. Pl. 51. Andr. Repoſ. t. 155. I. dubia; Redout. Liliac. t. 64. Venten. Choix. t. 10.)—Corolla widely ſpreading; tube capillary; limb pale at the baſe. Stigmas ſeparate as low as the tube.—The *ſtem* ſometimes bears many ſpikes. The *flowers* are ſmaller than in the laſt, white or yellow, without any broad dark ſtain. They come late in the ſummer, and are inodorous. It is very difficult to find a good ſpecific character between plants ſo variable, and yet ſo much alike.

Section 3. *Style extended above the anthers. Bulb ſomewhat tuberous and deformed.*

12. I. *crateroides.* Ker in Curt. Mag. t. 594. Ait. Hort. Kew. ed. 2. v. 1. 89. (I. ſpecioſa; Andr. Repoſ. t. 186.)—Corymb of two or three flowers. Limb of the corolla hemiſpherical; tube very ſhort. Style longer than the ſtamens.—Found at the Cape by Mr. Nevin. The *flowers* rarely ſo many as three on a ſtem, are large, concave, of a rich crimſon within, paler externally. Their ſtyle is ſo long as to extend nearly to the end of the anthers before the ſtigmas branch off.

Section 4. *Anthers ſhort. Stigmas cloven.*

13. I. *retuſa.* Saliſ. Hort. 35. Ait. Hort. Kew. ed. 2. v. 1. 89. (I. polyſtachya; Jacq. Ic. Rar. t. 275. Ker in Curt. Mag. t. 629. Andr. Repoſ. t. 128.)—Tube of the flower twice as long as the ſpatha; ſegments of the limb elliptic-oblong. Stigmas cloven and gaping.—This, being often branched, has been taken for the *polyſtachia* of Linnæus, a name now laid aſide, as cauſing only confuſion. That we have retained is indeed not unexceptionable, the ſegments of the corolla not being always abrupt. It is a tall ſlender ſpecies. *Flowers* ſmall, roſe-coloured, ſmelling like lily of the valley.

14. I. *ſcillaris.* Linn. Sp. Pl. 52. Ker in Curt. Mag. t. 542. Redout. Liliac. t. 127. (I. pentandra; Linn. Suppl. 92. Thunb. Diſſ. n. 22. I. reflexa; Andr. Repoſ. t. 14.)—Spatha as long as the tube. Segments of the limb ſpatulate, concave. Stigmas funnel ſhaped. Anthers deflexed.—That this is the real I. *ſcillaris* of Linnæus, not unaptly compared by him to *Scilla amoena*, appears from his herbarium; though Thunberg induced Linnæus the younger to call it *pentandra*, becauſe the ſtamens are ſometimes four or five, and led him to adopt his own *ſcillaris*, Diſſ. n. 14.—It differs from *retuſa* in the above characters, and has no ſcent. The *leaves* are broad, with many ribs. *Flowers* roſe-coloured, in a long ſpike.

15. I. *criſpa.* Linn. Suppl. 91. Thunb. Diſſ. n. 8. t. 2. f. 3. Ker in Curt. Mag. t. 599.—Leaves ſtrongly undulated. Stigmas funnel-ſhaped, deflexed.—A beautiful little ſpecies, on account of its curiouſly waved and criſped *leaves*. The *flowers* are roſe-coloured, inodorous; their ſegments obovate and concave.—Thunberg ſays they vary at the Cape to blue or white.

Ixia, in *Gardening*, contains plants of the herbaceous, bulbous, and tuberous-rooted perennial kinds; of which the ſpecies principally cultivated are, the crocus-leaved ixia (I. bulbocodium); the Chineſe ixia (I. chinenſis); the roſe-coloured ixia (I. roſea); the bulb-bearing ixia (I. bulbifera); the bearded ixia (I. ariſtata); the bending-ſtalked ixia (I. flexuoſa); the many-ſpiked ixia (I. polyſtachia); the ſpotted ixia (I. maculata); and the crocus-flowered ixia (I. crocata.)

The firſt of theſe ſpecies varies with white and yellow flowers; with purpliſh and yellow flowers; with blue and white flowers; with white flowers; and with variegated flowers.

The third ſort alſo varies with the three inner ſegments of the corolla yellow, and the three outer green; with the three inner white yellow, and the three outer greeniſh; with the three inner blue white, and the three outer greeniſh; with the three inner white, and the three outer green; with corollas wholly yellow, or wholly blue, or roſe-coloured, with a yellow baſe; and in the ſize of the flowers.

The fourth ſort likewiſe varies with the corolla purple, red and white, yellow; with the ſcape very ſhort and ſimple, higher and branched, and bulbiferous.

The fifth ſpecies varies with the ſegments of the borders of the corolla of a deep and elegant purple violet colour within, three of them of the ſame colour on the outſide, but the three others alternately of a pale dirty violet; one of theſe, with two on the ſide of it, has a double band in the throat, meeting at one end; and, according to Mr. Saliſbury, with whitiſh corollas, having a purple ſtar, violet-coloured and yellow. Alſo in the figures of Miller, with the corolla of a beautiful purple on the outſide, but white within, and the ſtem terminated by two or three flowers; with the ſtalk terminated by two large flowers; the outſide of a violet colour, edged with white, and the inſide pale blue; and with one flower, and the corolla of a moſt beautiful purple colour, both within and without.

The ſeventh kind varies with the corollas yellow and violet, of one colour.

And the ninth ſort varies with a ſhort, ſimple, five-flowered ſcape, and a dark ſpot above the windowed, or hyaline one; with a lofty, many-ſpiked, many-flowered ſcape; and with bright red flowers.

Method of Culture.—Theſe plants may be increaſed by ſeeds or off-ſets from the roots.

The ſeeds of ſuch ſorts as can be procured ſhould be ſown in pots filled with light earth in the ſpring, plunging them in a mild hot-bed. When the plants have attained ſome growth, they ſhould be removed into ſeparate pots of the ſame earth, being placed under the protection of a frame till they have taken root. They ſhould be placed during the winter in a hot-bed frame. They may afterwards be removed into warm borders, being protected from froſts in the winter, and a few retained in pots under the frame, or in a dry ſtove.

But they are three or four years in flowering when raiſed from ſeeds.

The common way is, therefore, to increaſe them by planting off-ſets from the roots, which are afforded in great plenty; the proper ſeaſon for this is in the early ſpring, before the ſhooting of the root, when the roots ſhould be removed, and the off-ſets taken from them and planted out.

The old roots ſhould not be removed oftener than every three years.

As ſoon as the ſtems and leaves decay to the roots in the borders in autumn, they ſhould be covered over with tan a few inches thick, to protect them from froſt, and the depredations of mice.

The hardy ſorts ſerve to adorn the borders in the open ground, and the other tender ſorts among other potted green-houſe plants that require protection in winter.

IXIA, in *Surgery*, a dilated vein; a varix.

IXO, in *Geography*, a town of Japan, in the iſland of Niphon; 65 miles E.N.E. of Meaco.

IXORA, in *Botany*, ſo named from *Ixora*, a Malabar idol, to whom its flowers are offered by the Indians in their ſolemn feſtivals.—Linn. Gen. 54. Schreb. 70. Willd. Sp. Pl. v. 1. 609. Mart. Mill. Dict. v. 2. Ait. Hort. Kew. ed. 2. v. 1. 244. Juſſ. 203. Lamarck Dict. v. 3. 343. Illuſtr. t. 66. Gærtn. t. 25, and t. 95.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, four-cleft, very ſmall, erect, permanent. *Cor.* of one petal, funnel ſhaped; tube cylindrical, ſlender, very long; limb four-cleft, flat; ſegments various in ſhape. *Stam.* Filaments four, riſing above the mouth of the corolla, very ſhort, incurved; anthers oblong. *Piſt.* Germen inferior, roundiſh, ſtyle thread-ſhaped, the length of the tube; ſtigma cloven. *Peric.* Berry roundiſh, two-celled. *Seeds* ſolitary, convex on one ſide, angulated on the other.

Obſ. Gærtner has remarked that the partition of the fruit is perforated juſt above the centre, and that the ſeeds are never more than two in each berry, though the Hortus Malabaricus deſcribes three or four. Sufficient characters are wanting to diſtinguiſh this genus from *Pavetta*.

Eſſ. Ch. Calyx four-toothed, ſuperior. Corolla of one petal; tube long, thread-ſhaped; limb four-cleft, widely ſpreading. Stamens riſing above the mouth. Stigma cloven. Berry of two cells. Seeds ſolitary.

The ſpecies of this fine Indian genus have not been in general clearly underſtood. We ſhall attempt an explanation of them, with an account of ſome hitherto entirely nondeſcript.

1. I. *coccinea.* Linn. Sp. Pl. ed. 1. 110. Lamarck Dict. v. 3. 342. (Schetti; Rheede Hort. Mal. v. 2. 17. t. 13. Jaſminum flore tetrapetalo, Ixora Linnæi; Burm. Zeyl. 125. t. 57.)—Leaves elliptic-obovate, ſomewhat heart-ſhaped at the baſe, not longer than the corymb. Segments of the corolla ovate, acute, flat. Style but little extended beyond the tube. Native of ſandy and ſtony places on the coaſt of Malabar, bearing flowers and fruit all the year. A *ſhrub* the height of a man, with round, ſmooth, greyiſh, leafy branches. *Leaves* oppoſite, nearly ſeſſile, two inches or more in length, about one broad, more or leſs obovate, or ſomewhat elliptical, obtuſe, entire, ſmooth, often pointed; their baſe for the moſt part heart-ſhaped, but varying in breadth; their upper ſide poliſhed. *Stipulas* embracing the ſtem in pairs, within the leaves, and alternate with them, awl-ſhaped, longer than the footſtalks, broad and triangular at their baſe. *Corymb* terminal, repeatedly forked, denſe, of from ten to thirty inodorous flowers; the ſtalks ſmooth and ſhining, red, as well as the *calyx*, whoſe ſegments are ovate or triangular, their points a little ſpreading. Tube of the *corolla* an inch and half long, very ſlender; ſegments of the limb each about half an inch long, horizontally ſpreading, ovate or elliptical, pointed. The hue of the limb, according to Rheede, is a fleſh-colour, deeper on the inſide, at length turning yellow and paler; the tube of a coral red. *Stamens* very ſmall and red, with yellow *anthers*, burſting longitudinally at their inner ſide into two cells. *Style* very little extended beyond the tube, with a thick red *ſtigma*, of two elliptical lobes, cohering in the dried ſpecimen. *Berries* the ſize of a ſmall currant, reddiſh-brown, ſhining, ſweet and eatable.—We have never met with this ſpecies in any garden.

2. I. *flammea.* Saliſ. Hort. 62. (I. chinenſis; Lamarck Dict. v. 3. 344. I. coccinea; Curt. Mag. t. 169. Schneev. Ic. t. 1. Ait. Hort. Kew. ed. 2. v. 1. 244. Flamma ſylvarum peregrina; Rumph. Amb. v. 4. 107. t. 47.)—Leaves elliptic-lanceolate, bluntiſh, ſtalked; narrow at the baſe. Segments of the corolla orbicular, obtuſe, rather convex. Style extended to half the length of the limb.—Native of Java, according to Rumphius; as well as of China, from whence we have a ſpecimen. It is not rare in our ſtoves, where the ſplendour of its flame-coloured flowers cauſes it to be much admired. Lamarck has well diſtinguiſhed it from the above, and Mr. Saliſbury long ago made the ſame remark. The *leaves* are five or ſix inches long, contracted at each end, ſtanding on ſhort, thick footſtalks. *Corymb* almoſt globoſe, compoſed of 100 flowers, or more, whoſe tube is but half, or two-thirds, the length of the former, but rather leſs ſlender; the ſegments of the limb broad and round, very obtuſe, each not ¼th of an inch long. *Stamens* ſpreading. *Style* rather longer than in the foregoing, with red ſpreading lobes of the ſtigma, but theſe cohere after drying.

3. I. *longifolia.* (Flamma ſylvarum; Rumph. Amb. v. 4. 105. t. 46.)—Leaves ovato-lanceolate, taper-pointed. Segments of the corolla elliptical, ſharpiſh, reflexed.—Native of moſt iſlands in the Eaſt Indies, according to Rumphius. We have a ſpecimen from the late Mr. Chriſtopher Smith, gathered in Honimoa. Thoſe who attend to Rumphius's deſcription and figure of his *Flamma ſylvarum*, and conſider that all his figures are diminiſhed, muſt be aware that his plant can belong to neither of the foregoing ſpecies, for which it has been quoted indifferently. Our ſpecimen exactly anſwers to his account, and is undoubtedly a new ſpecies. The *leaves* are ſeven or eight inches long, and two or three broad, ovate at the baſe, tapering at the end to a very fine point. *Footſtalks* half an inch long, channelled. *Stipulas* much ſhorter than in either of the former. *Corymbs* from the boſoms of the two upper leaves, as well as terminal, much branched from their very bottom, repeatedly forked, conſiſting of innumerable *flowers*, whoſe tube is as long and ſlender as in the firſt ſpecies, and of a light red; but the ſegments of the limb rather ſmaller, elliptical, not ovate, ſpreading widely, and more or leſs reflexed. The *ſtamens* are very ſhort. *Style* but little prominent. Rumphius ſays the flowers are of a vermilion hue on their inſide, which becomes a blood colour as they grow old, whence ariſes their brilliant fiery aſpect, the origin of the name. The *berries* turn firſt purple and finally black.

4. I. *incarnata.* Roxb. MSS.—Leaves elliptical, ſeſſile. Segments of the corolla roundiſh, obtuſe, ſomewhat reflexed. Corymb above half as long as the leaves.—Native of the Eaſt Indies. Our ſpecimen was communicated by lord viſcount Valentia, who received it from Dr. Roxburgh with the above name. The *leaves* are two inches long, and one

broad, nearly or quite ſeſſile, elliptical, ſlightly pointed. *Stipulas* with a very broad ſhort baſe, and ſhort ſlender point. *Corymb* about two-thirds the length of the leaves, denſe, level-topped, many-flowered. *Tube* of the flowers above an inch long, very ſlender; *limb* ſmall, its ſegments ſhaped much like I. *flammea*, but rather leſs. *Style* projecting above half their length. By the name we preſume the flowers are fleſh-coloured. In a dried ſtate their tube looks reddiſh, the limb pale.

5. I. *arborea.* Roxb. MSS. (I. Pavetta; Andr. Repoſ. t. 78.)—Leaves elliptic-oblong, on ſhort ſtalks. Segments of the corolla linear, obtuſe, reflexed, one-third the length of the tube. Corymb denſe, half as long as the leaves.—Native of the Eaſt Indies. It flowered in the dowager lady de Clifford's ſtove in the autumn of 1799, as Mr. Andrews mentions, but his name is altogether founded in error. The *leaves* are three or four inches long, and above one broad, coriaceous, widely ſpreading, on ſhort thick ſtalks; their baſe ſlightly heart-ſhaped. *Flowers* innumerable, dirty-white, ſmall, fragrant, in very denſe corymbs, whoſe ſtalks are a little downy; their tube is ſcarcely half an inch long, ſegments of the limb one-third as much, linear-oblong, recurved or reflexed, as are alſo the *anthers*. The *ſtyle* projects in ſome degree; the *ſtigma* is large and green, cloven, but not ſpreading.

6. I. *barbata.* Roxb. MSS.—Leaves elliptic-oblong, pointed, ſtalked. Segments of the corolla obovate, obtuſe, reflexed, denſely bearded at their baſe. Corymb ſpreading, equal to the leaves.—Brought by lord viſcount Valentia from the Eaſt Indies. The *leaves* are five or ſix inches long, two or more in breadth, with blunt points. *Footſtalks* half an inch long. *Corymbs* three at the end of the branch, equal, many-flowered, looſe and ſpreading, about as long as the leaves, and very broad. Tube of the flowers an inch and a quarter in length, ſlender at the baſe, but rather ſwelling upwards; *limb* reflexed, its ſegment $\frac{1}{4}$th of an inch long, obovate, obtuſe, twiſted in the bud, revolute when dry, denſely bearded at their baſe only, about the orifice of the tube, with longiſh white hairs. The colour of the *flowers* ſeems to be reddiſh.

7. I. *undulata.* Roxb. MSS.—Leaves ovate, pointed, ſtalked. Segments of the corolla oblong, reflexed, ſmooth, half as long as the tube. Corymbs numerous, denſe, panicled.—For this alſo we are obliged to lord Valentia, who received it, with the two laſt, from Dr. Roxburgh. The *leaves,* about four or five inches long, are of a broad ovate figure, tapering to a point; their edges wavy. *Footſtalks* above half an inch long. *Panicles* terminal, longer than the leaves, repeatedly forked, ſpreading, each branch terminating in a denſe many-flowered corymb. The *tube* is about half an inch long, not very ſlender, reddiſh; *limb* and *ſtamens* half that length, reflexed. *Style* projecting to the extent of the limb.

8. *I. laxiflora.*—Leaves elliptic-oblong. Segments of the corolla ſpreading, convex, bearded on their upper ſurface. Panicle corymboſe, lax, widely ſpreading, longer than the leaves. Gathered at Sierra Leone, by Dr. Adam Afzelius, to whom we are obliged for a ſpecimen, and the publication of whoſe rich diſcoveries is much to be deſired, though he himſelf has hitherto been unable to attain that object. We wiſh to ſecure his fame, not to encroach upon it. The *leaves* of this ſpecies are two or three inches long, and rather above an inch wide, all ſomewhat pointed; the uppermoſt rounded at the baſe, and quite ſeſſile; the reſt tapering down into a winged foot-ſtalk. *Stipulas* with ſhort points. *Panicles* terminal, ſolitary, ſtalked, nearly twice as long as the leaves, many-flowered, repeatedly branched and divaricated, ſlender and lax. *Calyx* tubular, with very ſhort rounded teeth. *Tube* of the corolla an inch long, very ſlender, ſlightly ſwelling upwards; ſegments of the *limb* one-third as long, obovate with a ſmall recurved point; their edges reflexed, their diſk hairy half way along the middle from the baſe. *Stamens* very ſhort. *Style* projecting almoſt the length of the limb, with long, nearly linear, ſtigmas. We have no account of the colour of the *flowers.* In the dried ſpecimen they are dark brown, with a purpliſh tinge.

9. I. *parviflora.* Vahl. Symb. v. 3. 11. t. 52. Ait. Hort. Kew. ed. 2. v. 1. 244.—Leaves nearly ſeſſile, lanceolate-oblong. Corymbs denſe, panicled. Segments of the corolla elliptical, reflexed, one-fourth the length of the tube.—Native of the Eaſt Indies. We have a ſpecimen ſent by Koenig to Linnæus, which was never deſcribed, but we have no doubt of its being Vahl's plant. The *leaves* in our's are two or three inches long, or more, lanceolate inclining to obovate, coriaceous, reticulated with veins. *Footſtalks* thick and very ſhort. *Stipulas* broad and ſhort, with a rigid ſtraight point. *Panicle* rather longer than the leaves, erect, ſtraight, branched from the bottom; the branches downy, each bearing a denſe corymb of red *flowers,* whoſe tube is about half an inch long, not very ſlender, and whoſe limb is ſcarcely one-fourth that length, its ſegments elliptical, and ſmooth.

10. I. *alba.* Linn. Sp. Pl. ed. 1. 244. (Bem-ſchetti; Rheede Hort. Mal. v. 2. 19. t. 14.)—Leaves elliptic-lanceolate, pointed, ſtalked. Panicle corymboſe, ſtalked, of few flowers. Segments of the corolla ovato-lanceolate, acute, about half as long as the tube.—Native of the Eaſt Indies. This ſpecies ſtands on the authority of the *Hortus Malabaricus,* whence Linnæus adopted it, for there is no ſpecimen in his herbarium, and the ſynonym of Plukenet, t. 109. f. 2, ſurely belongs to our firſt ſpecies of all. Miller is ſaid in Hort. Kew. to have cultivated *I. alba* before 1768, but we have never been able to ſatisfy ourſelves concerning this ſpecies in any garden. A ſpecimen in fruit from profeſſor David Van Royen, of what he had from Thunberg under this name, agrees tolerably with Rheede's figure, though the fruit being globoſe, or rather depreſſed, not elliptical, is an exception, neither is our ſaid fruit didymous, like Gærtner's t. 95. Rheede contraſts his plants with the true *I. coccinea,* his *Schetti,* t. 13, juſtly ſaying that the *leaves* are rather longer, more pointed at the end, and contracted at the baſe. The *flowers* are white or yellowiſh, with a reddiſh tube. *Stamens* longiſh and ſlender. *Style* prominent. *Fruit* more oblong than round, pale green or yellowiſh.

11. I. *americana.* Linn. Am. Acad. v. 5. 393; excluding the ſynonym of Plumier. Sp. Pl. ed. 2. 160; excluding the ſyn. of Browne. (Peteſia, N° 1; Brown. Jam. 145. t. 2. f. 3.)—Leaves elliptical, pointed at each end, on long downy footſtalks. Panicles axillary, downy; their branches cymoſe.—Gathered by Dr. P. Browne near the waterfall is Mammee river in Jamaica. His own ſpecimen is before us, ſhewing how much Linnæus has confuſed the hiſtory of this plant, by a miſquotation of ſynonyms that belong to *Coffea occidentalis,* hence leading Lamarck to ſuppoſe theſe two very diſtinct ſhrubs might be one and the ſame. We are not however by any means of opinion that the preſent is a real *Ixora,* but till its fruit be better known, the queſtion cannot be decided. Dr. Swartz appears not to have touched upon it. The *leaves* grow by threes, on ſtalks about an inch and half long, half their own length. The *flowers* are very ſmall, ſhort, thick, and downy, truly cymoſe, at the ends of long forked panicles.

12. I? *multiflora.* Swartz. Ind. Occ. v. 1. 240. Willd.

n. 6.—“ Leaves lanceolate-ovate, cluſtered. Flower-ſtalks aggregate, ſingle-flowered, very ſhort. Berries with one ſeed.”—Native of Jamaica. A ſtill more doubtful *Ixora* than the laſt, or rather a *ſhrub* of a diſtinct genus. Dr. Wright, to whom we are obliged for a ſpecimen, obſerves that “ the *ſtamens* are in the bottom of the *corolla ;* the *berry* white, ſmall, ſweet, with a ſingle compreſſed ſeed.”—The ſmall box-like *leaves*, and denſe tufts of *flowers* from lateral buds, are quite foreign to this genus, as is the ſwelling tube of the *corolla*.

I. *faſciculata*, Sw. Prodr. 30, is now by that author himſelf removed to *Chomelia*, Fl. Ind. Occ. v. 1. 238.

How far the *Pavetta* of authors, or any of the ſpecies ranged under it, may be referable to *Ixora*, we are not at preſent competent to determine, but we are well aſſured that their generic characters require inveſtigation. S.

Ixora, in *Gardening*, comprehends plants of the ſhrubby, flowering, exotic kinds, of which the ſpecies moſtly cultivated are, the ſcarlet ixora (I. coccinea) ; and the white ixora (I. alba).

Method of Culture.—Theſe plants may be increaſed by ſeeds, when they can be procured from the countries where they grow naturally, as they do not perfect them in this climate. They ſhould be ſown in ſmall pots as ſoon as they arrive, and be plunged into a hot-bed when they arrive in the autumn or winter ſeaſons, the pots being plunged in the tan-bed in the ſtove ; but when they come in the ſpring, it is beſt to plunge them in a tan-bed under frames. The ſeeds ſometimes come up in about ſix weeks, if they are quite freſh ; otherwiſe they lie in the ground four or five months, or longer. The earth ſhould therefore not be thrown out of the pots till there are no hopes of their growing. When the plants come up, and are fit to remove, they ſhould be each planted in a ſeparate ſmall pot, filled with light earth, being preſerved in the green-houſe or ſtove.

They may alſo be increaſed by cuttings, which ſhould be planted during the ſummer months, in ſmall pots, and plunged into a moderate hot-bed, covering them cloſe either with bell or hand glaſſes, to exclude the external air, ſhading them from the ſun in the heat of the day, until they have put out good roots, when they ſhould be parted, and each put into a ſeparate pot, treating them as the ſeedling plants. Mr. Curtis thinks it probable, that theſe plants are leſs tender than is ſuppoſed.

They afford variety among other ſtove or green-houſe plants.

IXWORTH, in *Geography*, a town of England, in the county of Suffolk, with a weekly market on Friday ; 78 miles N.N.E. of London.

IYAR, in *Chronology*, the ſecond month of the eccleſiaſtical Jewiſh year, anſwering to part of our April and May.

JYENAGUR, or Joinagur, called alſo *Jyepour* and *Jaepour*, in *Geography*, a circar or province of Hindooſtan, ſituated S. of the Mewat. The capital of this circar is Jaepour or Jaynagur; 70 miles E.N.E. of Agimere. N. lat. 26° 58′. E. long. 26° 9′. The raja of Jaepour, called Jeſſing, has erected two obſervatories, one in his newly built capital of Jaepour, which is about a league from Umbeer, or Ambeer, the ancient capital, the other in one of the ſuburbs of Delhi. At the former obſervatory father Claud Boudier, at the rajah's requeſt, made ſome obſervations in 1732 ; and probably, by the aſſiſtance of the ſame rajah, at Agra and Delhi.

JYEPOUR, a town of Hindooſtan, in the circar of Cattack : 16 miles N.E. of Cattack.

JYTEPOUR, a town of Hindooſtan, in Bundelcund ; 18 miles N.E. of Chatterpour.

JYVASKYLA, a town of Sweden, in the government of Waſa ; 120 miles S.E. of Waſa.

IZENDICK, a town of France, in the department of the Scheldt, and chief place of a canton, in the diſtrict of L'Ecluſe. The place contains 1121, and the canton 5001 inhabitants, on a territory of 112½ kiliometres, in five communes.

IZER, a town of Africa, in the weſtern part of the country of Berdoa.

IZIGINSK, a town of Ruſſia, in the government of Irkutſk, on the river Izigin, about 15 miles from its mouth. It is defended by an encloſure of paliſades, and wooden baſtions, erected in piles at the four angles. Theſe baſtions are provided with cannon, and a variety of military ſtores. The governor's houſe is defended by a conſtant guard. The houſes are conſtructed of wood, low, and having a regular front. The number of inhabitants is about 5 or 600, who are either merchants, or in the ſervice of government. The commerce conſiſts of furs, and the ſkins of rein deer. N. lat. 63° 10′. E. long. 159° 14′.

IZIUK, a town of Ruſſia, in the government of Toboliſk, on the Irtiſch ; 240 miles E.S.E. of Toboliſk.

IZIUM, a town of Ruſſia, in the government of Charkov, on the river Donetz ; 64 miles S.E. of Charkov.

IZQUITENANGO, a town of Mexico, in the province of Chiapa.

IZTICHUILOTLI, in *Natural Hiſtory*, the American name of a ſtone found in New Spain, and ſome other places ; it is very hard, of a beautiful black, and takes a fine poliſh. The Americans are very fond of it as a gem, and wear it by way of ornament.

De Laet mentions an American ſtone in his poſſeſſion, which was cut by the Indians into a flat oval plate, and was of a beautiful black, but with two round ſpots of a ſilvery white. He ſuppoſes this to have been the uterinus lapis, and probably it was either that ſtone, or of the ſpecies here mentioned.

IZTICPASO-QUERZALIZTLI, the name given by the natives of ſome parts of America, to a ſtone famous for its virtues in curing colic, and many other diſeaſes, externally applied. It is of a beautiful green colour, and is by Ximenes ſuppoſed a coarſe ſpecies of emerald ; but is more properly a very fine kind of lapis nephriticus, of a pale green colour, very hard, and more pellucid than the other ſpecies of that ſtone, but yet always ſhewing that greaſy look on being poliſhed, which characterizes all the nephritic ſtones. It is uſually found in large maſſes, and the Indians cut it into flat pieces, which they apply to the navel in the colic, and in other diſeaſes to the part affected, and ſuppoſe it has great power in promoting a diſcharge of the noxious humours.

IZTLI, the American name of a ſpecies of ſtone, of which the natives made their weapons of war, &c. before they knew the uſe of iron. It is called by De Laet and other authors, lapis novacularum.

K.

K, A double conſonant, and the tenth letter of the alphabet.

This conſonant has the ſound of hard *c*, and is uſed before *e* and *i*, where, according to the Engliſh analogy, *c* would be ſoft; as in the words *kept*, *king:* at the end of words it is not much uſed, except after *c*, and chiefly in monoſyllables, as *clock*, *back*, &c. It is now properly omitted in many other words, as *muſic*, *public*, &c. It is alſo uſed between a vowel and the ſilent *e* final, as *cloke*, *broke*, &c. It likewiſe ends a word after a diphthong, as *look*, *break*, &c. In the preſent pronunciation, *k* is ſilent before *n*, as *knee*, *knell.* It is never doubled; but *c* is uſed before it, to ſhorten the vowel by a double conſonant, as *cŏckle*, *pĭckle.*

K is borrowed from the Greek *kappa*, and was but little uſed among the Latins. Priſcian looked on it as a ſuperfluous letter, and ſays it was never to be uſed except in words borrowed from the Greek. Dauſquius, after Sallus, obſerves, that it was unknown to the ancient Romans. Indeed we ſeldom find it in any Latin authors, excepting in the word *kalendæ*, where it ſometimes ſtands in lieu of a *c*. Carthage, however, is frequently ſpelt on medals with a K: SALVIS AVG. ET CAES. FEL. KART. and ſometimes the letter K alone ſtood for *Carthage.*—M. Berger has obſerved, that a capital K, on the reverſe of the medals of the emperors of Conſtantinople, ſignified KONSTANTINUS; and on the Greek medals he will have it to ſignify ΚΟΙΛΗ ΣΥΡΙΑ, Cœleſyria.

Quintilian tells us, that in his time ſome people had a miſtaken notion, that wherever the letter *c* and *a* occurred at the beginning of a word, *k* ought to be uſed inſtead of the *c*. See C.

Lipſius obſerves, that K was a ſtigma, anciently marked on the foreheads of criminals with a red-hot iron.

The letter K has various ſignifications in old charters and diplomas; for inſtance KR. ſtood for *chorus*, K.R.C. for *cara civitas*, KRM. for *carmen*. KR. AM. N. *carus amicus noſter*. KS. *chaos*. K.T. *capite tonſus*, &c.

The French never uſe the letter *k*, excepting in a few terms of art, and proper names borrowed from other countries. Ablancourt, in his dialogue of the letters, brings in *k* complaining, that he has been often in a fair way to be baniſhed out of the French alphabet, and confined to the countries of the North.

K is alſo a numeral letter, ſignifying 250, according to the verſe:

> " K quoque ducentos et quinquaginta tenebit."

When it had a ſtroke at top, $\overline{\text{K}}$, it ſtood for 250,000.

K, on the French coinage, denotes money coined at Bourdeaux.

The letter K is the initial of no muſical term; and as moſt of the muſical technica are derived from the Italian, in which language K has no admiſſion, the Greek *kappa*, and the hard *c* being ſupplied by *che*, this letter will chiefly occur in German words, and proper names.

KAABA. See CAABA.

KAADE, in *Geography*, a town of Arabia Felix, in the province of Yemen; 12 miles N. of Taas.

KAALING, in *Ornithology*, the name of a ſpecies of ſtarling, common in China, and not unfrequent in the Philippine iſlands. It is black; but its eyes, legs, and beak are yellow. It is eaſily kept tame, and may be taught both to ſing and talk. It eats rice and inſects in its wild ſtate; but when kept in a cage, will feed very heartily on bread, and all kinds of fruit.

KAARTA, in *Geography*, a conſiderable ſtate of Africa, bounded on the N. by Ludamar, on the E. by Bambarra, on the S. by Fooladoo and Manding, and on the W. by Kaſſon and Fooladoo; about 200 miles long and 80 broad. Its capital was formerly a large and populous town, called Kemmoo; which has been ſince deſtroyed. The ſovereign of Kaarta received Mr. Park with great kindneſs; and major Houghton was the only European whom he had ever before ſeen. The language of the country ſeemed to Mr. Park to be formed of a mixture of the Mandingo and Sera-Woolli; but the Mandingo was generally underſtood. N. lat. 13° 10′ to 15°. W. long. 5° 10′ to 8° 20′.

KAAT's KILL, or CATSKILL, a ſmall, but thriving place in America, in Green county, and ſtate of New York, on a creek of the ſame name, W. of Hudſon's river; 5 miles S. of Hudſon city, and 125 N. of New York. In its vicinity are Kaat's Kill mountains, which are the firſt part of a chain of mountains, called the Alleghany, or Appalachian mountains. The townſhip of this name contains 2468 inhabitants.

KAAU-BOERHAAVE, ABRAHAM, in *Biography*. See BOERHAAVE, ABRAHAM KAAU.

KAAWI, in *Geography*, a town of Sweden, in the government of Kuopio; 22 miles E.N.E. of Kuopio.

KAB, in the *Jewiſh Antiquity*. See CAB.

KABALA, in *Geography*, a town of Perſia, in the province of Schirvan; 36 miles S.S.W. of Scamachie.

KABANI, in the *Oriental Offices*, a perſon who ſupplies the place of what we call the notary public. All obligations that are valid are drawn by him; and he is likewiſe the public weigh-maſter, and every thing of conſequence ought to be weighed before him.

KABANSKOI, in *Geography*, a town of Ruſſia, in the government of Irkutſk; 28 miles W.N.W. of Verchnei-Udinſk.

KABARDA, a town of Ruſſia, in the government of Caucaſus; 32 miles E. of Ekaterinograd.

KABASSI, a town of European Turkey, in the province of Albania; 24 miles N. of Aleſſio.

KABASSON, in *Zoology*. See DASYPUS *Unicinctus*.

KABBA, in *Geography*, a town of Africa, in the kingdom of Bambarra, ſeated on the Niger; 10 miles N.E. of Sego. It is ſituated, ſays Mr. Park, in the midſt of a beautiful and highly cultivated country, bearing a conſiderable reſemblance to the central part of England, and abounding with the "ſhea" tree, the fruit of which produces the ſheatoulou, or tree-butter. The tree very much reſembles the American oak, and the root, from the kernel of which the butter is prepared, by boiling it in water, has ſomewhat the appearance of a Spaniſh olive. The butter produced by it, beſides the advantage of its keeping without ſalt, is, in Mr. Park's opinion, whiter, firmer, and of a richer flavour than the beſt butter he ever taſted made from cow's milk. The growth and preparation of this commodity ſeem to be among the firſt objects of African induſtry, in this and the neighbouring ſtates, and it conſtitutes a main article of their inland commerce.

KABBADE, or CABADE, the name of a military habit of the modern Greeks, which they wear under another garment.

KABBALA. See CABBALA.

KABBOS, in *Ichthyology*, the name of an Eaſt Indian fiſh of the Muſtela kind. It grows to about two feet long, has no ſcales, but feels ſmooth and ſoft like the eel, and is of a brown colour; the noſe or ſnout much paler than the reſt, and ſpotted with black. The head is obtuſe, and the eyes placed very near the extremity of it.

KABERAN, in *Geography*, a town of Perſia, in the province of Khoraſan; 45 miles E. of Meſchid.

KABESQUI, or CABESQUI, is the name of a piece of money, equal in value to five deniers and a *maille* of French, coined and current only in Perſia.

KABESTERA, in *Geography*, a diſtrict of Africa, on the Gold Coaſt.

KABIKI, a town of Japan, in the iſland of Niphon; 25 miles S.W. of Nigata.

KABIN, KHABIN, *Kebin*, or *Kubin*, a temporary kind of marriage, in uſe among the Mahometans.

The kabin is contracted before the cadi, in whoſe preſence the man eſpouſes the woman for a certain time, upon condition that if he quits her at the end of that term, ſhe ſhall be allowed a certain ſum of money.

Some authors ſay that the kabin is only permitted among the Perſians, and in the ſect of Ali; but others maintain that it is practiſed among the Turks.

KABIS, CHABIS, or *Gabbis*, in *Geography*, a town of Perſia, in the province of Kerman. N. lat. 31°. E. long. 57 50′.

KABOJA, a town of Japan, in the iſland of Niphon; 90 miles W. of Meaco.

KABRA, a town of Africa, in the kingdom of Tombuctoo, on the N. ſide of the Niger; 8 miles S.E. of Tombuctoo.

KABREND, a town of Perſia, in Farſiſtan; 38 leagues S. of Schiras.

KABROANG, one of the Silibabo iſlands, in the Eaſt Indian ſea, about 18 miles in circuit. N. lat. 3° 50′. E. long. 126° 30′.

KABRUA, a town of European Turkey, in Bulgaria; 16 miles S. of Ternova.

KACHAN, a town of Perſia, in the province of Irac; 35 leagues N. of Iſpahan.

KACHAO, a town of Africa, in the kingdom of Kambu, on the river San Domingo, about 50 miles from its mouth; ſurrounded with a rampart and paliſades, and defended by artillery and a Portugueſe garriſon. It has a pariſh church, and a convent of Capuchins. N. lat. 12° 6′. W. long. 16°.

KACHIRA, a diſtrict of the government of Tula, in Ruſſia, on the Occa.

KACHTAN, a diſtrict or territory of Arabia, in the province of Yemen. It is of ſmall extent, and lies among the mountains, about three days' journey northward from Nedſjeran. It is governed by a ſchieck.

KACIAZYN, a town of Lithuania, in the palatinate of Wilna; 36 miles N.E. of Wilna.

KACOVA, a town of Tranſylvania; 12 miles S. of Coloſvar.

KACUNDY, a town of Africa, in the country of the Foulahs, ſeated on the E. ſide of the river Nunez; not far from its opening into the Atlantic.

KADAN, or CAADAN, a town of Bohemia, in the circle of Saatz; 12 miles W. of Saatz. N. lat. 50 20′. E. long. 13° 16′.

KADAR, a town of Mingrelia; 16 miles N.N.E. of Anerghia.

KADANAKU, in *Gardening*, the name of a plant. See ALOE.

KADARI, or KADARITES. See CADARI.

KADELY, a town of Bengal; 8 miles N.W. of Ramgur.

KADEN, in *Geography*, a town of Ruſſian Lithuania, in Poleſia; 14 miles S. of Brzeſc.

KADEN-KAN, a town of Aſiatic Turkey, in Caramania; 28 miles W. of Cogni.

KADER, an iſland at the N.W. extremity of the Perſian gulf, formed between the ſtreams of the Euphrates and the Tigris.

KADESIA, a town in the Arabian Irak; 80 miles S.W. of Bagdad.

KADJANG, a town on the W. coaſt of the iſland of Celebes. S. lat. 6° 28′. E. long. 119° 50′.

KADIEI, or KADYI, a town and diſtrict of Ruſſia, in the government of Koſtroma; 68 miles E.N.E. of Koſtroma.

KADITTE, a town of Pruſſia, in the circle of Natangen; 23 miles S. of Brandenburg.

KADNIKOV, a town and diſtrict of Ruſſia, in the government of Vologda; 10 miles N.N.E. of Vologda.

KADOM, a town and diſtrict of Ruſſia, in the government of Tambov, or Tambof, on the river Mokcha; 108 miles N.N.E. of Tambov.

KADRAGUTA, a town of Hindooſtan, in the circar of Singboom; 40 miles S.E. of Doeſa.

KADROS, a town of Aſiatic Turkey, in Natolia; 28 miles E. of Amaſieh.

KADSINDA, a town of Japan, in the iſland of Niphon; 30 miles S.W. of Nambu.

KADZURIM, a town of Hindooſtan, in Bahar; 12 miles N.E. of Rotaſgur.

KÆADAS, καιαδας, among the Lacedæmonians, a dungeon for throwing their criminals into. It was of the ſame nature with the Athenian barathron, or orygma.

KÆKURIAGHAKA, in *Botany*, a name uſed by ſome authors for the tree which affords the gum elemi of the ſhops.

KÆMPFER, ENGELBERT, in *Biography*, a celebrated German phyſician and naturaliſt, was born, in the year 1651, at Lippe, in Weſtphalia. It appears that he was educated in Sweden, where, for ſome years, he cultivated with zeal and ſucceſs the ſeveral ſtudies of phyſic, natural philoſophy, and natural hiſtory. His great deſire for travelling made him ſeize with avidity an opportunity of accompanying the Swediſh ambaſſador Fabricius to Perſia; whom he attended in the capacity of ſecretary. He departed from Stockholm in 1683; ſpent a ſhort time at Moſcow, and then proceeded to Iſpahan, where he remained two years. His ardour in the purſuit of knowledge had ſo much increaſed during this period, that inſtead of returning with Fabricius, he obtained the appointment of chief ſurgeon to the Dutch Eaſt India company, in which capacity he had the full enjoyment of his wiſhes, for he penetrated as far as the kingdoms of Siam and Japan. The geography of theſe parts had been but very imperfectly known, till Kæmpfer's genius and induſtry ſupplied the deficiency, and the world is indebted to him, for having firſt given a correct idea of the ſituation of different places, which had before been inacceſſible to ſtrangers. On his return to Europe in 1694, he graduated at Leyden, and ſettled in his own country. Here he did not remain idle, but was conſtantly employed in the compoſition of ſeveral works, and in the practice of phyſic. He was appointed phyſician to his ſovereign, and terminated a uſeful life in the year 1716, aged 65. His inaugural diſſertation, publiſhed at Leyden in 1694, is intitled "Decas obſervationum exoticarum." Of this a copy is preſerved in Dr. Smith's library, but we have never met with any other. The ſubjects on which it treats are, 1, the *Agnus Scythicus*, or Borometz: 2, the bitterneſs of the Caſpian ſea: 3, of the native *Mumia*, or bitumen, of Perſia: 4, of the Torpedo, or electrical fiſh of the Perſian gulf: 5, of the drug called dragon's blood, produced by the fruit of a palm: 6, of the *Dracunculus* of the Perſians, a ſort of worm proceeding from a tumour in the ſkin: 7, on the *Andrum*, or endemic hydrocele of the Malabars: 8, on the *Perical*, or ulcer of the feet among the ſame people: 9, on the cure of the colic amongſt the Japaneſe by puncture with a needle: 10, on the *Moxa*, or actual cautery, of the ſame people and the Chineſe. Theſe ſubjects are, as Haller obſerves, all of them probably treated more fully in the great work of our author, publiſhed at Lemgow in 1712, entitled "Amoenitates Exoticæ," and ſo often quoted by Linnæus for its botany, as well as other authors for its authentic details, relating to the hiſtory and manners of Perſia, and other parts of the Eaſt. His hiſtory of Japan is well known by the Engliſh tranſlation in folio, and is extremely valued for its accuracy and fidelity. Kæmpfer was ſkilled in the uſe of the pencil, as the plates of his works teſtify. Some botanical drawings of his, made in Japan, are preſerved in the Britiſh Muſeum. Of theſe ſir Joſeph Banks, in 1791, liberally preſented the learned world with 59 folio engravings at his own expence. Many of the plants are ſtill undetermined by ſyſtematic botaniſts. Hall. Bibl. Bot. Kæmpf. Opera.

KÆMPFERIA, in *Botany*, named by Linnæus in commemoration of KÆMPFER, (ſee that article,) was ſelected for that purpoſe with the more propriety, becauſe of the excellent original account and figure given of the plant by this writer, in his valuable *Amoenitates Exoticæ*, 901.—Linn. Gen. 4. Schreb. 5. Willd. Sp. Pl. v. 1. 15. Mart. Mill. Dict. v. 3. Roſcoe Tr. of Linn. Soc. v. 8. 350. t. 20. f. 10. Dryandr. in Ait. Hort. Kew. ed. 2. v. 1. 7. Juſſ. 64. Lamarck Illuſtr. t. 1.—Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. Roſcoe. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular, ſheathing, membranous, ſplitting on one ſide. *Cor.* of one petal; tube about as long as the calyx, cylindrical, erect; outer limb in three equal, ſpreading, linear, acute, involute ſegments; inner two-lipped, the upper lip of two oblong lobes, lower of one or two broader, rounded, ſpreading ones. *Stam.* Filament one, erect, oblong, flat, much ſhorter than the limb, extending much above the anther, and terminating in two ſpreading equal lobes; anther attached by its back to the middle of the filament, of two oblong, nearly marginal, rather diſtant lobes, meeting round the ſtyle, burſting at their outer edge. *Piſt.* Germen inferior, ſmall, roundiſh; ſtyle thread-ſhaped, embraced by the anther; ſtigma cup-ſhapped, concave, fringed, projecting a little beyond the anther. *Peric.* Capſule roundiſh, ſomewhat triangular, of three cells and three valves. *Seeds* ſeveral.

Eſſ. Ch. Anther two-lobed. Filament extending above the anther, two-lobed at the top. Outer limb of the corolla in three equal, linear, acute lobes; inner two-lipped.

1. K. *Galanga*. Galangale. Linn. Sp. Pl. 3. Hort. Cliff. 2. t. 3. Redout. Liliac. t. 144. Sims in Curt. Mag. t. 850. (Wanhom; Kæmpf. Amoen. Exot. 901. t. 902.)—Upper ſegments of the inner limb of the corolla obtuſe, ſlightly three-lobed; lower ones deeply ſeparated, undulated. Leaves depreſſed, broad-ovate, pale beneath.—Native of the Eaſt Indies. Kæmpfer met with it in Japan in a cultivated ſtate only. With us it is rare; kept in the ſtove, and flowering in July. The *root* is perennial, tuberous, throwing out elliptical ſtalked knobs, like the Peony. Theſe are fleſhy and white within, with a grateful and pungent aromatic flavour, which remains long after they are dried. They are ſtill uſed in the Eaſt for their ſtomachic and tonic properties, but are laid aſide in European practice. *Stem* none. *Leaves* ſeveral, ſheathing, ſpreading in a depreſſed poſition, three or four inches long, and nearly as broad, many-ribbed; dark-green, and ſmooth above; paler, glaucous and downy beneath. *Flowers* ſeveral, radical, ſeſſile, in the centre of the leaves, white, with two purple ſpots at the baſe of the lower or front lobes of the inner limb. We cannot help remarking the ſuperiority of Linnæus's fine engraved plate over any coloured one that has met our notice.

2. K. *rotunda*. Round-rooted Kæmpferia. Linn. Sp. Pl. 3. Sims in Curt. Mag. t. 920. Woodv. Med. Bot. t. 133. (K. longa; Jacq. Hort. Schoenbr. v. 3. 37. t. 317. Redout. Liliac. t. 49. Malan-kua; Rheede Hort. Mal. v. 11. 17. t. 9.)—Upper ſegments of the inner limb of the corolla acute, entire; lower ones deeply ſeparated, obovate. Leaves erect, elliptic-oblong, acute, coloured beneath.—Native of the Eaſt Indies. Mr. Miller is ſaid to have cultivated it in 1768, but the plants, now not unfrequent in the ſtoves of this country, all probably originated from what ſir George Yonge introduced in 1791. The knobs of the *roots*, rather leſs oblong than thoſe of the former, are pungent and aromatic. The *leaves* grow upright, and are a foot long, remarkable for the fine purple colour of their under ſide. The *flowers* appear early in the ſpring, before the leaves, with a few ſheathing green bracteas that grow likewiſe from the root. They are ſweet-ſcented, white, except the lower lip, which is of a light purple, prettily variegated.

3. K. *anguſtifolia*. Narrow-leaved Kæmpferia. Roſcoe Tr. of Linn. Soc. v. 8. 351.—Upper ſegments of the inner limb of the corolla linear, obtuſe; lower one emarginate. Leaves lanceolate, pale beneath.—Native of the Eaſt Indies, from whence it was introduced into the Kew garden in 1797 by ſir Joſeph Banks. It flowers in the ſtove, about March or April. Mr. Roſcoe examined it in the botanic garden at Liverpool, and all our knowledge of this ſpecies is comprized in the above definition.

4. K. *ovata*. Ovate Kæmpferia. Roſcoe, ibid. (Manjakua; Rheede Hort. Mal. v. 11. 19. t. 10.)—Lower ſegment of the inner limb of the corolla lanceolate, undivided. Leaves ovate.—All our knowledge of this plant is derived from the Hortus Malabaricus, from whence Mr. Roſcoe

adopted it, there being no doubt of the genus. It is there ſaid to be perennial, flowering in April and May. The *root* is a globoſe tuber, an inch in diameter, yellow internally, with concentric red and orange lines; of a very ſtrong taſte and ſmell, reſembling ginger and ſaffron. *Leaves* a foot long, elliptical, pointed, tapering down into ſheathing footſtalks, of a pleaſant ſcent and bitteriſh taſte. *Flowers* ſix or ſeven from the centre among the leaves, ſhort-lived, white with a tinge of red, their tube much longer than the limb. Rheede's figure diſplays the generic character ſufficiently well, and ſhews the lip, or lower ſegment of the inner limb to be undivided, ovate, acute, and wavy. *Seeds* rarely perfected. The *Curcuma rotunda* of Linnæus ſeems chiefly to depend on this ſynonym of Rheede. His herbarium throws no light upon the matter.

KÆMPFERIA *Rotunda*, in the *Materia Medica*. See ZEDOARY.

KAEN, in *Geography*, a town of Africa, and capital of a kingdom, on the banks of the river Gambia. N. lat. 13°.

KAFAR TUTHA, a town of Aſiatic Turkey, in the province of Diarbekir; 32 miles S.W. of Niſibin.

KAFER, a town of Perſia, in the province of Farſiſtan; 40 miles S. of Schiras.

KAFFABA, a town of Africa, and capital of a kingdom of the ſame name, in Soudan. N. lat. 11° 45′. W. long. 0° 12′.

KAFFERS, or rather KOUSSIS, a tribe of people who inhabit thoſe parts of Africa that lie to the north and eaſt of the colony of the Cape of Good Hope. Mr. Barrow has not been able to aſcertain how far the belt of country extends in width acroſs the ſouthern part of Africa, that is inhabited by the Kaffers; but the points on each coaſt to which they do not extend are ſufficiently determined. To the ſouthward of the Portugueſe ſettlement of Rio de la Goa, the natives are Kaffers, but appear to be a degenerated race. They are, however, *free;* nor has Portugueſe avarice yet dared to attempt to make them ſlaves. This is not the caſe to the northward. At Mozambique and Soffala, the black people are all negroes; not indeed the natives of the ſea-coaſt, but ſuch as are brought down from the interior as articles of trade. From Mozambique, they have now a direct communication acroſs the continent with their ſettlements of Congo, Loango, and Benguela, on the weſt coaſt, as appears from the information of a Portugueſe ſlave merchant, between which negro merchants are eſtabliſhed in different parts of the country. In the line of this route there are therefore no Kaffers. It further appears that another powerful tribe of the ſame nation, called "Baroloos," inhabit the country under the ſouthern tropic, nor are theſe the laſt to the northward. According to the account given of this people, they are of a kind and friendly diſpoſition; their town is ſo extenſive, that if a perſon ſet out in a morning from one extremity and travelled to the other, he would not be able to return before the following day; and contains many thouſand inhabitants; the people are very ingenious in carving of wood, and have furnaces for ſmelting both copper and iron: they are very rich in cattle, and their gardens and lands are better cultivated, and their dwellings much ſuperior to thoſe of *Leetakoo*, which ſee. The "Damaras" alſo, who poſſeſs the art of ſmelting copper from the ore, are inhabitants of the tropic; and they are complete Kaffers, differing in no reſpect from thoſe on the eaſtern coaſt. Mr. Barrow, therefore, ſuppoſes, that a line drawn from the 24th parallel of latitude on the E. coaſt to the 20th on the W., may nearly mark the boundary between the Kaffers and the Negroes.

An open and manly deportment, ſays Mr. Barrow, free from ſuſpicion, fear, or embarraſſment, ſeems to characterize the Kaffer chiefs. Though extremely good-humoured, benevolent, and hoſpitable, they are neither ſo pliant nor ſo paſſive as the Hottentot. Thoſe of the poorer claſs ſometimes ſeek for ſervice among the boors, and engage themſelves for ſo many moons in conſideration of ſo many head of cattle; but they never ſuffer themſelves to be duped out of their hire like the eaſy Hottentots. They are for the moſt part tall, upright, and well-made men; and in their ſtature and ſtrength they exhibit ſatisfactory evidence that animal food is by no means neceſſary to promote the growth of the human ſpecies, or to add ſtrength of fibre to the muſcular parts of the body. Milk in a curdled ſtate is the principal food of the Kaffers. To this they ſometimes add a few gramineous roots, berries of various kinds, the ſeeds of the "Strelitzia Reginæ," and the pith of a large palm, to which botaniſts have given the name of Zamia. They rarely kill any of their cattle, unleſs upon particular occaſions. They poſſeſs no other domeſtic animals to yield them food. In the whole Kaffer country they have neither ſheep nor goats, pigs nor poultry. They cultivate no kind of grain nor vegetables on this ſide of the Great Fiſh river, and very little on the other ſide; but the Kaffer tribes more to the weſtward, are very conſiderable horticulturiſts. The commiſſioners, ſent out by the Britiſh government in the year 1801, to endeavour to procure a ſupply of draught oxen, found extenſive fields of a ſpecies of Holcus near the city Leetakoo, the capital of a tribe of Kaffers, called "Booſhooanas," ſituated at the diſtance of 16 days' journey beyond the Orange river, in the direction of north-eaſt from the Cape. The women here, as well as among the eaſtern Kaffers, and indeed in all nations juſt emerged from a ſavage ſtate, went through all the hard labour and drudgery that were required for the ſupport of the family. They not only performed the taſk of breaking up the ground with a kind of hoe made of iron, and afterwards planted it; but they conſtructed their habitations, and collected the materials that were neceſſary. They reaped the grain, cleared it from the huſk, and laid it up in the granaries, which, with other earthen pots and wooden veſſels, were the work of their hands. The men prepare the ſkins and hides which ſerve for ſhoes, and make them up into cloaks for themſelves, their wives and children. They attend alſo the cattle, milk the cows, and hunt the antelopes and other game, with a weapon called the Haſſagai, which is uſed alſo in battle.

Mr. Barrow is of opinion, that the Kaffers were not the aborigines of the ſouthern angle of Africa; but that they might, perhaps, derive their origin from ſome of thoſe wandering tribes of Arabs known by the name of *Bedouins*. Their paſtoral habits and manners, their kind and friendly reception of ſtrangers, their tent-ſhaped houſes, the remains of Iſlamiſm diſcoverable in one of its ſtrongeſt features, the circumciſion of male children, univerſally practiſed among the Kaffer hordes, ſeem to indicate their Arabic origin and their affinity to the Bedouin tribes. Their countenance alſo is Arabic; the colour only differs, which in ſome tribes varies from deep bronze to jet black, but the latter is moſt generally the prevailing colour. Nor is it likely that they owe this colour to their connection with thoſe blacks that are uſually called negroes, as they have no reſemblance, in any part of the body, to the peculiar conformation of this race of human beings. To the Ethiopians or Abyſſinians they have a much cloſer reſemblance. Barrow's Travels in Southern Africa. See CAFFRARIA and DELAGOA *Bay*, under which latter article the reader is requeſted to ſubſtitute Kaffers for Kuffers, a typographical error.

KAFR Errizé, a town of Egypt, on the left bank of the Nile; 18 miles S. of Cairo.

Kafr *el Riſk*, a town of Egypt, on the left bank of the Nile; 3 miles N.E. of Atfieh.

KAGA, a town of Japan, on the N. W. coaſt of Niphon. N. lat. 57° 15′. E. long. 137° 40′.

KAGAN, a town of Ruſſia, between Aſtrachan and the Caſpian ſea; 10 miles S. of Aſtrachan.

KAGEROD, a town of Sweden, in the province of Skone; 12 miles S.E. of Helſingborg.

KAGNAS, a ſmall iſland in the gulf of Bothnia. N. lat. 64° 48′. E. long. 21° 7′.

KAGZEVAN, a town of Aſiatic Turkey, in the government of Erzerum. N. lat. 39° 35′. E. long. 43° 20′.

KAHAKAMAN, a ſmall iſland in the Eaſt Indian ſea, near the N. coaſt of Borneo. N. lat. 7° 21′. E. long. 117° 33′.

KAHEC, a town of Perſia, in Segeſtan; 37 miles S.W. of Dergaſp.

KAHEDE, a town of Africa, on the N. ſide of the Senegal. N. lat. 16° 8′. W. long. 11° 47′.

KAHEM, or Cajem, a town of Aſiatic Turkey, on the Euphrates; 50 miles W.S.W. of Ana.

KAHGON, a town of Bengal; 20 miles S. of Moorſhedabad.

KAHIASSCE, in the Turkiſh court, an officer of ſtate, anſwering to our maſter of the ceremonies.

KAHIRIA, in *Botany*, Forſk. Ægypt. Arab. 153. See Ethulia *conyzoides*.

KAHL, in *Geography*, a town of Germany, on a river of the ſame name, near the Maine; 4 miles S. of Hanau.

KAHLA, a town of Saxony, in the principality of Altenburg, on the Saal; 36 miles W. of Altenburg. N. lat. 50° 48′. E. long. 11° 27′.

KAHOKIA, a poſt-town of America, and chief town of St. Clair county, in the Indiana territory, containing 719 inhabitants.

KAHONE, a town of Africa, in the kingdom of Burſali. N. lat. 13° 56′. W. long. 16 8′.

KAHUN, a town of Perſia, in the province of Kerman; 36 miles S. W. of Sirgian.

KAHUNSILYA, or Kaonsalia, in *Hindoo Hiſtory*, was the wife of Daſaratha, to whom ſhe bore Rama, diſtinguiſhed by the epithet of Chandra, (meaning Lunarian,) from other heroes of the ſame name. See Rama.

KAI, in *Geography*, a town of Ruſſia, in the government of Viatka, on the Kama; 124 miles N.E. of Viatka.

KAJAAGA, or Gallam, as the French call it, a ſmall negro kingdom of Africa, which occupies the extremity of the navigable courſe of the Senegal, terminated in this place by the cataract of F'low. This country is bounded on the N. by the Senegal, on the S.E. by Bambouk, and on the W. by Bondou and Foota Torra. The reſidence of the king is at Maana, within a ſhort diſtance of the ruins of Fort St. Joſeph, where the French had formerly a ſmall factory. The air and climate are, according to Mr. Park, more pure and ſalubrious than at any of the ſettlements towards the coaſt; the face of the country is agreeably interſperſed with hills and vallies, and the windings of the Senegal, which deſcends from the rocky hills of the interior, render the ſcenery on its banks picturesque and beautiful. The natives are called Sera-Woollies, and ſeem to be pure negroes, without any Mooriſh admixture, and are naturally of a mild and docile diſpoſition. With regard to their colour, which is a jet-black, they are not to be diſtinguiſhed from the Jaloffs. They are much addicted to trade, and formerly carried on a conſiderable commerce with the French in gold and ſlaves: they are reckoned tolerably fair and juſt in their dealings, though Mr. Park loſt among them about one-half of his goods and apparel: they are much devoted to the acquiſition of wealth, and they derive conſiderable profit from the ſale of ſalt and cotton cloth in diſtant countries. Their language abounds much in gutturals, and is leſs harmonious than that of the Foulahs; it is, however, well worth acquiring by thoſe who have occaſion to travel through this part of the African continent; as it is very generally underſtood in the kingdoms of Kaſſon, Kaarta, Ludamar, and the northern parts of Bambarra. In all theſe countries the Sera-Woollies are the chief traders.

KAIDA, in *Botany*, Rheede Hort. Mal. v. 2. t. 1—S. See Pandanus.

KAIDERM, in *Geography*, a town of Perſia, in Segeſtan; 90 miles W. of Zareng.—Alſo, a town of Perſia, in the province of Khoraſan; 15 miles E. of Terſhiz.

KAI-FONG, or Cai-fong, a city of the firſt rank in China, the capital of Ho-nan, ſituated at the diſtance of two leagues from the river Hoang-ho. As the river is higher than the city, it is ſubject to inundations, for the prevention of which, ſtrong dykes have been raiſed which extend more than 30 leagues. On occaſion of a ſiege in 1642, by an army conſiſting of 100,000 rebels, the commander of the troops ſent to relieve it determined to drown the enemy by breaking down the large dyke of Hoang-ho; the ſtratagem ſucceeded, the city was overflowed, and 300,000 inhabitants periſhed. It has been rebuilt ſince this calamitous event, but in a ſtyle far inferior to that of its former magnificence. Its juriſdiction comprehends four cities of the ſecond claſs and 30 of the third.

KAIGOL, a town of Perſia, in the province of Khoraſan; 225 miles N. of Herat.

KAIGUEZ, a town of Aſiatic Turkey, on the S. coaſt of Natolia; 18 miles S. of Mogla. N. lat. 36° 50′. E. long. 28° 19′.

KAIGUM, a town of Hindooſtan, in the circar of Aurungabad; 30 miles S.W. of Aurungabad.

KAIHA, a town of Sweden, in the province of Tavaſtland; 60 miles N.N.E. of Jamſio.

KAJIPET, a town of Hindooſtan, in the circar of Cuddapa, on the Pennar; 20 miles S.E. of Cuddapa.

KAILAFUETUEVSKOI, a town of Ruſſia, in the government of Irkutſk, on the Argun; 160 miles S.S.E. of Nertchinſk.

KAILASA. Hindoo mythologiſts have aſſigned different places of reſort or habitation to their different deities: that of Siva is Kailaſa, ſometimes written Cailas, which is deſcribed as one of the three peaks of the wonderful mountain, Meru. (See Meru.) Here the gods, with their conſorts, animated with muſic, dancing, and ambroſia, called by the Hindoos amrita (ſee Kurmavatara), paſs their hours in banquets and happy dalliance, reminding us ſtrongly of the tales of our own claſſics; and appearing indeed to be the ſame ſtories under different names. This ſimilarity occurs in every page of Moor's Hindoo Pantheon, although the author in that work profeſſes to avoid the diſcuſſion of ſuch ſimilarities. (See Kaliya.) The following inſtance, from page 47, will farther illuſtrate this and the preſent article. "The compariſon between Siva and Jove runs parallel in many inſtances. In the capacity of avenger and deſtroyer Jove overthrew the Titans and giants whom Typhon, Briareus, &c. led againſt the god of Olympus, to whom an eagle brought *lightning* and *thunderbolts* during the warfare.

In a ſimilar conteſt between Siva and the Daityas, or children of Diti, who frequently rebelled againſt heaven, Brahma is ſaid to have preſented the god of deſtruction with fiery ſhafts. As the Olympian Jupiter fixed his court and held his councils on a lofty and brilliant mountain, ſo the appropriated ſeat of Mahadeva, whom the Saivas conſider as the chief of the deities, is mount Kailaſa, every ſplinter of whoſe rocks is an ineſtimable gem." Kailaſa is therefore the Olympus of Siva or Mahadeva. See SIVA.

KAIMACHAN, among the Turks. See CAIMACHAN.

KAIMENI, in *Geography*, a ſmall iſland in the Grecian Archipelago. N. lat. 36° 57'. E. long. 23° 26'.

KAIMOO, a town of Africa, in Bambarra, ſeated on the Niger. N. lat. 13° 56'. W. long. 3° 46'.

KAIMOW, a town of Hindooſtan, in Bundelcund; 12 miles N. of Chatterpour.

KAIN, a town of Perſia, in Coheſtan; 60 miles S.S.W. of Herat.

KAINER, a town of Perſian Armenia; 24 miles S.E. of Erivan.

KAINGERSKOI, a ſmall iſland in the North Pacific ocean, near the eaſt coaſt of Kamtſchatka, belonging to Ruſſia. N. lat. 53° 40'. E. long. 160°.

KAINSK, a town of Ruſſia, in the government of Tobolſk, on the Om. N. lat. 56° 55'. E. long. 77° 54'.

KAIRA, a town of Hindooſtan, in Guzerat; 10 miles S.S.W. of Mahmoodabad.

KAIRABAD, a town of Hindooſtan, and capital of a circar in Oude, to which it gives name. The circar is bounded on the N. by Thibet, on the E. by Bahraitch, on the S. by Lucknow, and on the W. by Rohilcund; and is about 80 miles long and from 50 to 76 broad. The town is 86 miles N.W. from Fyzabad. N. lat. 27° 30'. E. long. 81° 8'.

KAISARIEH, anciently *Mazaca* and *Cæſarea of Cappadocia*, a town of Aſiatic Turkey, in the province of Caramania, the capital of a Sangiakat, ſituated at the foot of a mountain, always covered with ſnow, about five or ſix miles in circumference; ſurrounded with walls and defended by a caſtle. This town is well peopled, and in each of the 180 diſtricts to which it is divided, it has a moſque or chapel. The Greeks have two churches, one of which is a Metropolitan, and the Armenians have three. The article which conſtitutes its principal trade is Morocco leather; 250 miles E.S.E. of Conſtantinople. N. lat. 38° 20'. E. long. 35° 18.

KAISENI, a town of Walachia, on the Ardgis; 25 miles N.W. of Buchareſt.

KAISERBERG, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Colmar. The place contains 2428, and the canton 13,606 inhabitants, on a territory of 125 kiliometres, in 13 communes; 5 miles N.W. of Colmar.

KAISERSBERG, a town of the duchy of Stiria, having a caſtle on a hill; 5 miles S.W. of Leoben.

KAISERSECH, a town of France, in the department of the Rhine and Moſelle, and chief place of a canton, in the diſtrict of Coblentz; 12 miles W. of Coblentz. N. lat. 30° 18'. E. long. 7° 2'. The place contains 435, and the canton 2413 inhabitants, in 16 communes.

KAISERSLAUTERN, a town of France, and principal place of a diſtrict, in the department of Mont Tonnerre; 24 miles N.W. of Landau. N. lat. 49° 27'. E. long. 7° 47'. This town was ceded to France by the elector of Bavaria in 1802. The place contains 2363, and the canton 8640 inhabitants, in 21 communes.

KAI-TON-GI, a town of the iſland of Borneo; 60 miles S.S.E. of Negara.

KAJUC, a town of Aſia, in the country of Kharaſm; 23 miles N.W. of Samarcand.

KAKA-PAKSHA-DHARA, a name of Rama, in Hindoo hiſtory, and of other warriors, who had a habit of ſhaving their heads, leaving only the hair projecting over their ears, which was fancied to reſemble the wings of a crow. The name means *bearing-crow-wings*.

KAKA-TODDALI, in *Botany*, Rheede Hort. Mal. v. 5. 81. t. 41, is *Paullinia aſiatica* of Linnæus, diſtinguiſhed as a new genus by Juſſieu, under the uncouth name of *Toddalia*, and by Schreber under that of *Crantzia*. There having been another genus already given to profeſſor Crantz, Dr. Smith has called that of which we are ſpeaking *Scopolia*, Plant. Ic. under t. 34. See SCOPOLIA.

KAKATOES, in *Ornithology*. See PSITTACUS.

KAKBERG, in *Geography*, a town of Pruſſia, in the Friſch Nerung; 18 miles E.N.E. of Vogelſang.

KAKEGAVA, a town of Japan, in the iſland of Niphon; 95 miles S.W. of Jedo.

KAKELIK, in *Ornithology*, a ſpecies of *Tetrao*; which ſee.

KAKHET, or KAKHETTY, in *Geography*, the eaſtern part of the principality of Georgia, comprehending a part of the ancient Iberia, about 180 miles long and 90 broad. This ſtate, as well as Karduelia, borders northwards on the Kabarda, eaſtwards on Dagheſtan, ſouthwards on the Perſian Armenia, and weſtwards on Immeritia. This ſtate and Karduelia are under the ſole ſovereignty of a prince of the Kakhetian dynaſty. The reſidence is Teflis. The air is ſalubrious, but the country is thinly inhabited. The town Kaket, in this province, is ſituated near mount Caucaſus; 45 miles N N.E. of Teflis. See GEORGIA.

KAKI, a town of Japan, in the iſland of Niphon; 70 miles N. of Meaco.

KAKILAN, a town of Perſia, in the province of Segeſtan; 65 miles N. of Boſt.

KAKILE, in *Botany*, Broter. Luſit. v. 1. 498. See CAKILE, and BUNIAS, ſp. 12.

KAKKABBAN, in *Geography*, an iſland in the Eaſt Indian ſea, being one of the group called "Meratuba;" 40 miles from the E. coaſt of Borneo. N. lat. 2° 8'. E. long. 116° 50'.

KAKKAWATA, one of the Friendly iſlands.

KAKOPIT, in *Ornithology*. See CERTHIA *Amboinenſis*.

KAKOULI, in *Geography*, a town of Turkiſh Armenia; 23 miles E. of Baibourdi.

KAKURI, a town of Japan, in the iſland of Niphon; 85 miles N.E. of Meaco.

KAL, or KALA, in *Hindoo Mythology*, a name of Siva in his character of the *Deſtroyer*, in which he agrees with Saturn or Time, and is called alſo Maha-kala, *maha* being an epithet equivalent to *great*. Kali, or Maha-kali, is a name of his conſort Parvati, in one of her avenging or terrific characters, as ſhe appears in ſeveral of the plates of Moor's Hindoo Pantheon, wherein one of Kal is deſcribed as "Eternity, at the period of Maha-pra-laya, or grand conſummation of all things. In the original he, like his name, is *black*; he holds the roll of fate, and a ſcymitar to execute its deſtructive decrees. He devours man, his own offspring; towns, cities, "the great globe itſelf and all that it inherits"—the univerſe. The great perſonified powers of the Almighty, Brahma, Viſhna, and Siva, "alike await the inevitable doom:" they alſo "fall into the jaws of non-exiſtence." Kala will then, like Saturn, deſtroy himſelf, and nothing will remain but Brahm; the eternal one," p. 30. See KALI, KALPA, and MAHA-KALA.

KALAAT-EL-NEGUER, in *Geography*, a town of Aſiatic Turkey, in the province of Diarbekir; 25 miles S. of Bir.

KALADGIK, a town of Aſiatic Turkey, in Natolia; 8 miles S.E. of Kiangari.

KAL-AGNI-RUDRA, in *Hindoo Mythology*, a name of Siva, or rather three of his names combined. Kal is his name as Time, Agni as Fire, Rudra as Fate. See KAL, SIVA, and RUDRA.

KALANSHEE, in *Geography*, a town of Africa, in the country of Gonjah.

KALANTEKA, in *Hindoo Mythology*, is a name given to Yama, the judge of departed ſouls. (See YAMA.) It means the deſtroyer of Kal, or of Time, and is a perſonification of great boldneſs. See KAL.

KALATOE, in *Geography*, an iſland in the Eaſt Indian ſea, about 30 miles in circuit. S. lat. 7° 18′. E. long. 122° 15′.

KALATU SEFID, a town of Perſia, in Farſiſtan; 10 miles N. of Neubendjan.

KALBA, a town of Perſia, in the province of Mazanderan; 60 miles E. of Fehrabad.

KALBRA, or KELBRA, a town of Germany, in the principality of Schwarzburg-Rudolſtadt, on the Helm; 27 miles N. of Erfurt. N. lat. 51° 28′. E. long. 11° 4′.

KALCKREUTH, a town of Germany, in the territory of Nuremberg; 7 miles N. of Nuremberg.

KALCOBO, a ſmall iſland in the Eaſt Indian ſea. S. lat. 5° 20′. E. long. 117° 39′.

KALDEKIRCHEN, a town of France, in the department of the Roer; 8 miles N.N.E. of Ruremond.

KALDI, GEORGE, in *Biography*, a native of Hungary, was born in Tirnaw about the year 1572, and from his connections he might probably have attained to conſiderable preferment in the church, but he preferred enrolling himſelf in the ſociety of the Jeſuits. He was received into the order at Rome, and returning to his own country, he was baniſhed into Tranſylvania, with the other members of the ſociety, during the commotions which, at that time, agitated the kingdom. After this he diſcharged the duty of theological profeſſor in the univerſity of Olmutz, and filled ſome other important poſts in different places. His laſt retreat was to a college which he built at Preſburg, where he died, in the year 1634, at the age of ſixty-two. He was regarded as one of the moſt eloquent preachers in Hungary. He publiſhed a volume of ſermons at Preſburg in 1631, but he is chiefly celebrated, as an author, for having undertaken and completed a tranſlation of the bible from the Vulgate into the Hungarian tongue, which was printed at Vienna, in 1626.

KALDUROSAN, in *Geography*, a town of Walachia; 10 miles N.N.E. of Buchareſt.

KALE, WILLIAM, in *Biography*, a painter of ſtill life. In the catalogue of the gallery of the Louvre, at Paris, he is called *Kalf*, and there are two exquiſite works of his, uniting the merits of Rembrandt and Teniers. He was born at Amſterdam in 1630, and was a diſciple of Hendrick Pot, a portrait and hiſtorical painter; of whom he learned the practice of the art, but from whom he varied in the application of it; and applied his talents, which were very conſiderable, in a cloſe imitation of objects in ſtill life; which he compoſed with great beauty and effect. He poſſeſſed an eye informed with the power of Rembrandt's arrangements and contraſt of light and ſhade, and a hand, that managed the pencil with the neatneſs and correctneſs of Teniers: his pictures are therefore as agreeable perhaps as it is poſſible for the art to exhibit; when the kind of ſubjects which he choſe are repreſented. He died in 1693.

KALE, in *Botany*, &c. See BORECOLE, BRASSICA, and CRAMBE.

KALE, in *Agriculture*, the common name of a plant of the braſſica kind, which is occaſionally cultivated in the field for the uſe of live ſtock. There are ſeveral varieties of it in cultivation, which are all very hardy in their nature, riſe to a conſiderable height in the ſtem, and afford a large proportion of green food per acre. They are an excellent ſheep feed in the early ſpring months, as March and April, throwing out freſh ſprouts as the old ones become removed. The bite of ſheep is not by any means injurious to them; and they are capable of being fed off without hurdling, which is a very conſiderable advantage in moſt ſituations. See BORECOLE and BRASSICA.

KALE, in *Gardening*, the common name of a hardy tall growing plant of the cabbage kind; of which there are ſeveral varieties cultivated in gardens for winter and ſpring uſe, but the curled ſorts are probably the beſt for the table. They are capable of being had recourſe to for a conſiderable length of time, as they throw out ſprouts in great abundance, and are ready in thoſe ſevere parts of the winter ſeaſon when but few other greens can be procured, eſpecially in the more northern parts of the iſland. See BRASSICA and BORECOLE.

KALENBERG, in *Geography*, a general name given to a ridge of Auſtrian mountains, extending from near the ſource of the river Save, towards the Danube, about 9 Britiſh miles on the weſt of Vienna, where it is called Leopoldſberg; and ſuppoſed by Buſching to be the ancient Cetius. This ridge of Kalenberg was the weſtern boundary of Germany till about the year 1040, when it was removed E. to the river Leitha.

KALENDAR. See CALENDAR.

KALENDERI, in *Hindoo Mythology*, a daughter of Surya, or the Sun; ſpoken of alſo as a water nymph. She is one of the eight wives of *Kriſhna*, which ſee.

KALENDS. See CALENDS.

KALF, in *Geography*, a town of Sweden, in Weſt Gothland; 45 miles S. E. of Gotheborg.

KALFSKAR, a ſmall iſland on the eaſt ſide of the gulf of Bothnia. N. lat. 63° 34′. E. long. 20° 53′.

KALFVEN, a ſmall iſland on the weſt ſide of the gulf of Bothnia. N. lat. 61° 3′. E. long. 17° 7′.

KALGAGICHA, a town of Ruſſia, in the government of Archangel; 40 miles S.S.W. of Oneg.

KALGAPOL, a town of Hindooſtan, in Dowlatabad, on the Beemah; 12 miles S.W. of Naldourouk.

KALGUEV, an iſland in the Frozen ſea, about 140 miles in circuit; 240 miles N.N.E. of Archangel. N. lat. 68° 20′ to 69° 18′. E. long. 45° 30′ to 47° 30′.

KALHAT, CALHAT, or *Calajate*, a town of Arabia, in the province of Oman, at the mouth of a river of the ſame name, which runs into the Arabian gulf; 80 miles S.E. of Maſkat. N. lat. 23° 10′. E. long. 58° 25′.

KALHAT, *Cape*, or *Ras Kalhat*, a cape on the E. coaſt of Arabia. N. lat. 23° 18′. E. long. 58° 30′.

KALI, in *Agriculture*, the common name of a plant of the ſea kind, which affords a ſaline matter by incineration, which, in many ſorts of ſoil, is employed with great advantage as a manure, in combination with other ſubſtances. See QUERCUS *Marina*, and SEA-WEED.

KALI, in *Botany*, Tourn. Inſt. 247. t. 128, an Arabic name. (See SALSOLA.) The ſame appellation has been given to various ſucculent alkaleſcent plants.

KALI, in *Chemiſtry*. See CARBONAT *of Potaſh*, and ALKALI.

Kali, in the *Materia Medica.* See Salsola and Soda, and alſo Alkaline.

Kali, in *Hindoo Mythology*, a name and form of the goddeſs Parvati, conſort of Siva, in his character of *Kal* or *Time*, which ſee. Under this name and form ſhe is of a terrific appearance, and is thus deſcribed in Moor's Hindoo Pantheon, p. 151. "Maha-kali, or the Great Kali, black and dreadful, is encompaſſed by ſymbols of deſtruction: two of her hands ſeem employed in the work of death: of the other two, one appears pointing downwards, alluding to the univerſal havoc which ſurrounds her, while the other, pointing upwards, ſeems to promiſe the reſurrection of nature by a new creation. She is repreſented without a creſcent (the artificial meaſure of time), becauſe it is unneceſſary to her character as the hieroglyphic of eternity; but the belief of the Hindoos in ſucceſſive deſtructions and renovations of the univerſe (ſee Kalpa), accounts for her wearing a *mund mala*, or necklace of ſkulls, as emblems of thoſe revolutions." In that work are many plates of this deity under various names, including Bhadra-kali, as well as Maha-kali. Kali is the Hindoo name of the Nile, in the vicinity of which the ſcene of ſome of the Puranas is laid; and they relate, indeed, that the river itſelf is but a transformation of Kali, which, in Sanſcrit and other Indian languages, means *black*; as does Nila, another of her names, or rather *dark blue*: the following alſo are names of this multiform deity, and have a like meaning; Aſita, Shyama, or Shyamala, Mekara, Anjanabha, Kriſhna. (Ibid. p. 155.) Other plates in the ſame work, repreſenting the goddeſs, are thus deſcribed: "Plate 27. is taken from a braſs caſt depoſited by the author in the muſeum at the India-houſe: it is eighteen inches high, including the pedeſtal, which is about a foot in diameter, ſix inches deep and hollow, as if intended to be fixed on ſomething; and I was told ſuch images are occaſionally faſtened on the top of the *rat'h*, a carriage dragged about the ſtreets on certain feſtivals. Kali is ſaid to aſſume this form to frighten ſinners into repentance and virtue: her attitude ſeems a chacing one, aſſumed to cauſe immediate terror; her limbs bend; her hands are open, fingers lengthened into points, ſtretched out; a ſerpent forms her girdle; ſhe is naked, except a ſcanty cloth, called *pira*, round her middle; her belly is empty, thin, and ſhrivelled; her breaſts pendent, with long diſguſting nipples; a ſerpent convolves round her neck, and, twining on her boſom, projects its head to ſupport her protruded, long, rough tongue: her chin is peaked; immenſe teeth and tuſks are fixed in her lipleſs gums; her noſtrils and goggle eyes are diſtended and bloated; ſnakes form appropriate rings for her naſty ears, being knotted in the pendent lobes, with their heads raiſed, and their hoods expanded; her hair is ſtiffened out, forming a frightful glory round her head, diverging to meet a wider glory that riſes from a flower on each ſide, forming a ſupport to the figure. The caſt is of braſs; and, however diſguſting to the eye, is far from being devoid of merit: our engraving is taken from an exact portrait, and exhibits conſiderable expreſſion." P. 159.

"Plate 28. is from a very fine bronze image, about a foot high, caſt, I was informed, in the Carnatic. It was preſented to me by a Brahman, and is, I think, on the whole, the moſt elegant and beſt finiſhed figure in my poſſeſſion. She is, in this form, called Bhadra-kali, Mahakali, and by other names; alſo, being eight-handed, Aſhtabuja. Two of her hands are empty, pointing upward and downward, in the poſition before noticed: one of her right hands holds ſomething not unlike a caduceus, which, in the caſt, it reſembles more nearly than in the plate; its correſponding left hand the *Patra* (ſee Patra) or cup: the next right and left hands, a ſingular crooked ſword, and a ſhield with an emboſſed flower or fruit: the ſuperior right hand has an agricultural implement, called *nanga*; the left the cord *pas*, or *paſh* (ſee Pash), to catch or ſtrangle ſinners with. Her fine perſon is full dreſſed, with a profuſion of ornaments; between her full breaſts a five-headed ſerpent uprears itſelf; ſhe has a necklace of human heads; her eardrops are elephants; and a row of ſnakes' heads peep over her coronet. Her forehead is marked either with Siva's third eye (ſee Virupaksha), or her own hieroglyphic; and her open mouth ſhews her teeth and tuſks, giving her a fierce and threatening aſpect." P. 160.

KALININA, in *Geography*, a town of Ruſſia, in the government of Tobolſk, on the Tunguſka. N. lat. 60° 56'. E. long. 106° 26'.

KALIPH. See Caliph.

KALISCH, or Kalitz, in *Geography*, a city in the duchy of Warſaw, late the capital of a palatinate of the ſame name in Great Poland, or Weſtern Pruſſia, ſituated on the Proſna, and ſurrounded with walls, towers, and moraſſes. This palatinate was alſo called the "palatinate of Gneſen," from the city of that name; 57 miles N.E. of Breſlau. N lat. 51° 50'. E. long. 18°. See Gnesen.

KALITVA, a town and diſtrict of Ruſſia, in the government of Voronetz, ſituated on the rivulet Kalitva; which falls into the Don; 60 miles S.S.E. of Voronetz.

KALITVENSKAIA, a town of Ruſſia, in the country of the Coſſacks, ſeated on the Donetz.

KALIYA, or Kalanaga, in *Hindoo Mythology*, a ſerpent ſlain by Kriſhna, who, being the Sun, correſponds in this, and many other inſtances, with Apollo, the ſlayer of Python, both of whom, according to Clemens, were adored at Delphi; and in like manner both Kriſhna and Kaliya find adorers in India, where, in honour of Kriſhna's triumph, games and ſports are annually held, as the Pythic games were at ſtated times in Greece. Like the Pythian ſerpent in the temples of Apollo, Kaliya-naga enjoys alſo his apotheoſis in thoſe dedicated to Kriſhna; nor, ſays major Moor, in his Hindoo Pantheon, whence we have taken this article, "are arguments wanting toward identifying Serpentarius on our ſphere with his formidable foe, and the theatre of the conflict, the river Yamuna, or Jumna, with the via lactea. So the variety of demons ſent to annoy Kriſhna, are, perhaps, the allegorical monſters of the ſky, attempting in vain to obſtruct his apparent progreſs through the heavens, where other conſtellations are fabled as ſo many beautiful nymphs ready to receive him, and have given riſe to allegories of his inconſtancy." (See Krishna.) Other names of this mighty mythological ſerpent are, *Naga*, *Seſha*, and *Vaſcky*, which ſee.

KALIYANA-RAYA, a name of Viſhnu among the Hindoos, of whom there is, under this name, a ſtatue at Barra, on the banks of the Euphrates, which is ſaid to be carefully concealed from the ſight of the Mahometans.

KALKA, or Kalka-pira, in *Geography*, a river of Chineſe Tartary, which, though one of the ſmalleſt, gives name to the *Kalkas*. It riſes in a famous mountain, called Suelki, or Siolki, which name may be applied to the ridge that ſeparates the Kalkas from Chineſe Daouria, and which is 130 miles W. diſtant from Tcitcicar. This river empties itſelf into the lake Coulan.

KALKALLY, a town of Hindooſtan, in Dowlatabad; 20 miles E. of Nander.

KALKAS, a tribe of Tartars, conſiſting formerly of more than ſix hundred thouſand families, which inhabit the country that lies N. of the Mogul Tartars. Their country, which ſtretches as far as the kingdom of the "Eleuthes," is near 300 leagues in extent from eaſt to weſt. In this region was anciently ſituated, towards the 45th degree of N. latitude, the city of "Karakan;"—the ſeat of the empire of Tſchinghis-kan, and of that of his ſucceſſors. The Kalkas live in tents along the banks of the rivers which water their country; of which the principal, though they take their name from Kalka-pira, are the Kerlon, Toula, Touy, and Salingué. The banks of theſe rivers are well inhabited, and they flow through extenſive plains, which are covered with rich paſtures: their waters are very wholeſome, and abound with excellent fiſh, eſpecially trout. The vaſt deſert, called "Cobi," (which ſee,) occupies almoſt the whole ſouthern part of the country of the Kalkas. The war which the king of the "Eleuthes" (ſee Kalmuks) carried on in 1688 againſt the Kalkas almoſt deſtroyed the whole nation. To avoid the purſuit of a ſuperior enemy, they ſupplicated the aſſiſtance of the Chineſe arms, and offered to ſubmit to the empire. Kang-hi undertook their defence, conquered the king of the Eleuthes, and kept the Kalka Tartars under his dominion, after having conferred upon their princes different titles of honour.

KALKA-TARGAR, a country of Chineſe Tartary, which contains one claſs of Mongul Tartars. N. lat. 41° 50′. E. long. 110° 33′.

KALKE, one of the Prince's iſlands, in the ſea of Marmora; anciently called "Chalcitis," on account of its mines of copper, which have been long neglected. On this iſland are three large Greek monaſteries.

KALKI, in *Hindoo Mythology*, is the name given to an expected *avatara*, or manifeſtation of the god Viſhnu. (See Vishnu.) The incarnations of this deity are numerous; but ten of them are of more importance than the others, and are, for diſtinction, called the ten incarnations, *das-avatara*. Of theſe nine are paſt; in the tenth, or Kalki, Viſhnu is to appear mounted on a white horſe, with a drawn ſcymitar, blazing like a comet, to end the kali-yug, that is, the preſent, or iron age, preparatory to a renovation of the world with an era of purity, or ſatya-yug. (See Yug.) In pictures, this avatara is repreſented by a man leading a white-winged horſe. It is alſo called kalenki and aſwah; likewiſe ſaid to mean a horſe; but as kal is time, and in ſeveral dialects means both yeſterday and to-morrow; or, more extenſively, the paſt and future, it is ſurmiſed by the author of the Hindoo Pantheon, p. 188. that the name of kalki, applied to this ender and renovator of ages, may have ſome alluſion to that idea, rather than be confined to the form in which he is to be manifeſted. See Kal and Kalpa.

KALKISSEE, in *Geography*, a town of the iſland of Ceylon; 19 miles S. of Columbo.

KALKOON, or Turkey Islands, a cluſter of ſmall iſlands in the Eaſt Indian ſea. N. lat. 6° 15′. E. long. 115° 45′.

KALL, a town of Sweden, in Jamtland; 42 miles N.W. of Oſterſund.

KALLA, a ſmall iſland on the eaſt ſide of the gulf of Bothnia. N. lat. 64° 20′. E. long. 23° 26′.

KALLATMA, a town of Egypt; 15 miles N. of Coſſeir.

KALLERY, a town of Sweden, in the province of Smaland; 28 miles S.S.W. of Jonkioping.

KALLODRA, a town of Hindooſtan, in Guzerat; 16 miles N. of Surat.

KALLSKAR, a ſmall iſland in the N. part of the gulf of Bothnia. N. lat. 65° 43′. E. long. 23° 36′.—Alſo, a ſmall iſland on the E. ſide of the ſame gulf. N. lat. 63° 56′. E. long. 22° 43′.—Alſo, another ſmall iſland on the ſide of the gulf. N. lat. 63° 50′. E. long. 22° 33′.—Alſo, another ſmall iſland on the ſame ſide of the gulf. N. lat. 63° 26′. E. long. 21° 28′.

KALLVIKEN, a ſmall iſland in the N. part of the gulf of Bothnia. N. lat. 64° 18′. E. long. 21° 7′.

KALM, Peter, in *Biography*, a very celebrated naturaliſt, and pupil of Linnæus, the account of whoſe travels, from having been tranſlated into Engliſh, is well known in this country. He was a native of Finland, and was born in the year 1715. Having imbibed a taſte for the ſtudy of natural hiſtory, it appears that he purſued his inclination with much zeal and induſtry. His firſt reſearches were rewarded by the diſcovery of many new plants in Sweden, of which he gave ſome account to the botanical world between the years 1742 and 1746. He was particularly anxious to explore the virtues of plants, both with reſpect to their uſes in medicine, and in the uſeful arts, ſo that planting and agriculture occupied ſome portion of his attention. His reputation as a naturaliſt cauſed him to be appointed profeſſor at Abo, and in October 1747, he ſet out upon his travels, ſailing from Gottenburg for America; but on account of a violent hurricane was obliged to take ſhelter in a port of Norway, whence he could not depart till the enſuing February, when he proceeded immediately for London. From hence he went to North America, as we learn from his book; and having ſpent two or three years in exploring whatever was worthy of obſervation in that country, he returned to his profeſſorſhip at Abo in 1751. The expences of this undertaking appear to have exceeded what was allowed him by the Academy of Sciences, ſo that our author was obliged to live rather penuriouſly upon his return. Yet we are informed that he found means to cultivate, in a ſmall garden of his own, ſeveral hundred plants, for the uſe of the univerſity, as there was no public botanical garden at Abo. "His diſcoveries in botany very materially enriched the *Species Plantarum* of his great maſter, and the Linnæan Herbarium abounds with ſpecimens brought home by him, diſtinguiſhed by the letter K." Haller enumerates a long liſt of tracts publiſhed by Kalm, and his inaugural diſſertation appeared in the *Amœnitates Academicæ* of Linnæus. He was originally intended for the eccleſiaſtical profeſſion, but was drawn aſide from this purſuit by attending the lectures of Linnæus on natural hiſtory, given in the univerſity of Upſal. Indeed, it was through the recommendation of Linnæus that profeſſor Kalm was fixed upon to undertake the voyage to North America. He afterwards made, at his own expence, a very extenſive tour into Ruſſia, the hiſtory of which never appeared in print, but which is ſuppoſed to have furniſhed conſiderable matter for the work of a Swediſh writer, who publiſhed a book of travels in that kingdom. Kalm was a member of the Royal Swediſh Academy of Sciences, and departed this life in the year 1770, aged 64. His collection of dried plants, made in his various journies, and doubtleſs valuable for the purpoſes of botanical information, is ſaid to remain in the hands of his family in a ſtate of neglect. Hall. Bibl. Bot. Aikin. Gen. Biogr.

KALMIA, in *Botany*, a genus named by Linnæus in honour of his friend and pupil Peter Kalm, D.D. profeſſor of Economy at the univerſity of Abo. (See Kalm.) Linn. Gen. 217. Schreb. 293. Willd. Sp. Pl. v. 2. 600. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 2. 64. Juſſ. 158. Lamarck Dict. v. 3. 345. Illuſtr. t. 363. Gærtn. t. 63.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, ſmall, permanent, divided into five, ſubovate, acute, roundiſh ſegments. *Cor.* of one petal, ſalver or funnel-ſhaped; tube cylindrical, longer than the calyx ; limb with a flat diſk, the margin upright, five-cleft half way down ; ten little horn-like cells projecting outwardly from the corolla, and ſurrounding it where the border is upright. *Stam.* Filaments ten, awl-ſhaped, ſlightly ſpreading, a little ſhorter than the corolla, at whoſe baſe they are inſerted ; anthers with two pores. *Piſt.* Germen ſuperior, roundiſh, furrowed, ſtyle thread-ſhaped, longer than the corolla, declining ; ſtigma obtuſe. *Peric.* Capſule ſomewhat globoſe, depreſſed, five-celled and five-valved. *Seeds* numerous.

Eſſ. Ch. Calyx in five deep ſegments. Corolla cup-ſhaped, with ten prominences. Anthers with two pores. Capſule with five cells.

1. *K. latifolia.* Broad-leaved Kalmia. Linn. Sp. Pl. 560. Curt. Mag. t. 175. Sm. Inſ. of Georgia, t. 37.—“ Leaves ovate-elliptical, ternate and ſcattered. Corymbs terminal.”—Profeſſor Kalm relates that he found this ſpecies in various parts of North America, and eſpecially in the province of Pennſylvania, on the ſides of hills, and occaſionally in woods, which were enlivened by its foliage when moſt other trees had loſt their verdure. It was covered with a profuſion of beautiful bloſſoms in the month of May.—*Stem* 10 or 12 feet high, branched. *Leaves* rigid, bright green above, pale beneath, on ſhort footſtalks. *Flowers* in a round bunch, ſitting very cloſe to the branch, of a pale bluſh-colour, variegated beautifully with crimſon.

2. *K. anguſtifolia.* Narrow-leaved Kalmia. Linn. Sp. Pl. 561. Curt. Mag. t. 331.—“ Leaves lanceolate. Corymbs lateral.”—A native alſo of North America, flowering from May to July.—*Stem* from three to ſix feet high, divided into ſmall woody *branches*, covered with a dark grey *bark*. *Leaves* of a ſhining green colour above, paler beneath, obtuſe, on ſhort footſtalks, placed without order, varying in breadth. *Flowers* in looſe, lateral bunches, of a bright red colour when they firſt open, but afterwards fading to a bluſh or peach-colour.—There are two varieties of this ſpecies mentioned in the *Hortus Kewenſis*, one with red, the other with pale flowers.

3. *K. glauca.* Glaucous Kalmia. Willd. n. 3. Curt. Mag. t. 177. Ait. Hort. Kew. v. 2. 64. t. 8.—“ Leaves oppoſite, oblong, ſmoothiſh, glaucous underneath, revolute at the margin. Corymbs terminal. The little branches two-edged.”—Diſcovered by ſir Joſeph Banks at Newfoundland, and introduced into this country in 1767. It flowers in April and May.—This *ſhrub* is about two feet in height. *Stems* branched, round, reddiſh-brown. *Leaves* embracing the ſtem, each furniſhed with a broad, longitudinal, yellowiſh rib. *Flowers* on very long ſtalks, about five or ſix in a bunch, of a beautiful pink or roſe-colour.—It much reſembles *latifolia* in habit, but is conſiderably ſmaller, and of more humble growth.

4. *K. hirſuta.* Hairy Kalmia. Willd. n. 4. Curt. Mag. t. 138.—“ Leaves oppoſite and alternate, elliptical, hairy. Flower-ſtalks axillary, ſingle flowered.”—A native of South Carolina, in a ſwampy ſoil. It flowers in the autumn.—*Stem* upright, ſlender, about three feet in height, branched. *Leaves* ſmall, bright-green, numerous. *Flowers* purpliſh, axillary, each growing on a ſingle ſtalk, though inaccurately deſcribed by Curtis and Martyn as being racemoſe. The general appearance of this ſpecies is ſomewhat ſimilar to that of *Andromeda Daboecii*.

This whole genus is remarkable for its elegant flowers and foliage. It thrives well in a boggy ſoil, and is a general favourite in all gardens.

KALMIA, in *Gardening*, comprehends plants of the hardy evergreen ſhrubby kinds ; of which the ſpecies moſtly cultivated are, the broad-leaved kalmia (K. latifolia) ; the narrow-leaved kalmia (K. anguſtifolia) ; the glaucous kalmia (K. glauca) ; and the hairy kalmia (K. hirſuta).

The value of the firſt ſort, which is an elegant ſhrubby plant, is much leſſened by its noxious properties.

In the ſecond kind, there are varieties, with pale and deep red flowers, differing in their habit ; the latter, the moſt humble of the two, not only produces the moſt brilliant flowers, but in greater abundance. This is ſaid to be poiſonous to ſheep and cattle in its native ſituation, America.

Method of Culture.—Theſe different plants are capable of being increaſed by ſeeds, layers, and ſuckers from the roots. But the firſt ſort is moſt commonly raiſed from the ſeeds, which are procured from America, and ſown in pots or boxes filled with light ſandy mould, in the ſpring ſeaſon, and plunged in an eaſterly border, or in beds of light mould, in the ſame aſpect. However, when placed in a gentle hot-bed they ſucceed much better. They muſt, notwithſtanding, be inured to the full air of the atmoſphere during the ſummer ſeaſon, having ſhelter in the winter from froſt. As ſoon as the plants have had two years growth, they may be removed into ſeparate pots, in order to be continued two years longer or more ; when they may be planted out where they are to remain, in warm ſituations in the open ground.

The ſecond ſpecies is moſtly increaſed by layers, which ſhould be made from the young ſhoots, and laid down in the early autumn. In a year or two, when they are become well rooted, they may be taken off, and planted ſeparately in pots filled with bog earth, or in a warm border formed of the ſame ſort of ſoil. This is a more hardy kind than the former.

The third kind is moſtly increaſed in the ſame manner as the firſt, and demands a ſimilar method of treatment.

The fourth is capable of being raiſed from layers, but the plants are preſerved with difficulty in this climate.

Almoſt all the plants are likewiſe capable of being increaſed by ſuckers ; which ſhould be taken off, and planted out in the ſpring, in nurſery rows, for two or three years, after which they may be removed to the places where they are to grow.

In the more hardy ſorts, theſe plants afford ornament and variety, when properly placed in the fronts of clumps and ſhrubbery borders ; and in thoſe which are tender, in mixture with other potted, green-houſe, and other ſimilar plants.

KALMOUA, in *Geography*, a town of Pruſſia, in the circle of Natangen ; 12 miles S.S.E. of Marggrabowa.

KALMUCKS, OELOETS, or *Eleuthes*, a tribe of Tartars, who affirm their home to have been between the Kokonor or Blue lake, and Thibet. Long before Tſchingis-khan, according to the old reports of theſe people, the greateſt and mightieſt part of the Oeloets made a military expedition weſtward as far as the Leſſer Aſia, and there loſt themſelves among the mountains of Caucaſus ; but the reſt, who had ſtaid behind in Great Tartary, received from their Tartarian neighbours, the name Khalimak (the ſeparated). In fact they call themſelves alſo Khalmik, though Oeloet is always their peculiar denomination, which word likewiſe denotes a ſeparated, disjoined, or diſtinct nation. The Oeloets divide themſelves, at leaſt ſince the deſtruction of the Mongolian monarchy, into four main ſhoots, who denominate themſelves Khoſchot, Derbet, Soongarr, and Torgot ; and from the time of their ſeparation from the Mongoles or Monguls, they have been uniformly ſubjected to various princely families. The major part of the “ Koſchotan” Kalmucks are ſaid to have remained in and about Thibet and on the Kokonor, and after the downfal of the Soongarian power they have been under the protection of the Chineſe. The ſmaller part of this ſtock had long before withdrawn to the banks of the Irtiſh, and at length fell under the dominion of the Soongarian horde, with which it took part in the wars againſt China, and was alſo diſperſed at the ſame time with the Soongarians. Thoſe under the Chineſe ſovereignty, the ſtill united horde of the Khoſchotes, are eſtimated at 50,000 heads. They are reported to have had their name, which implies warrior or hero, from the courage they diſplayed under Tſchingis; and from this circumſtance, as well as their deriving their princely race in uninterrupted ſucceſſion from the brother of the great Tſchingis, they maintain a ſuperiority of rank above the other Kalmuck hordes. The number of Khoſchotes ſubject to Ruſſia is but ſmall. In the year 1675 there came 1500, and in 1759 an additional 300 families to the ſhores of the Volga, where they ſettled and voluntarily ſubmitted to the Ruſſian ſovereignty. The "Soongares," at the ſeparation of the Mongolian monarchy, formed but one ſtock with the Derbetans, who afterwards parted, under two diſcordant branches of their princely family. This horde, in the 17th and beginning of the 18th century, reduced to their ſubjection a great part of the other Kalmuck races, particularly the Khoſchot, Derbet, and Kho-it, and waged bloody wars with the Mongoles as well as with the Chineſe empire itſelf, but which ended in their total ſubjugation and diſperſion. Previouſly to this unhappy period, they, together with the Derbets, reckoned upwards of 50,000 fighting men, and were deemed the braveſt, richeſt, and moſt powerful horde. They reſided formerly about the Balkhaſh lake and its rivers Tſchuy and Ily; and their moſt flouriſhing period was between the years 1696 and 1746. The towns of the eaſtern Bucharia and the Great Kirghiſe horde were about this time tributary to them. Many of the Soongarians diſperſed themſelves in the interior parts of Aſia and quite into the Uſbeck towns; ſome thouſands of them fled into Siberia; and moſt of them accommodated themſelves to the Chineſe ſovereignty, and, from their own ſtatements, it appears, that ſcarcely 20,000 families of them and the Derbetan nation are now remaining. The number of the Soongares, who at that time (1758) took refuge in Ruſſia, amounted to about 20,000 heads; they were united with the Volgaic Kalmucks, but for the moſt part returned with them again in the year 1770 into the Soongarèy. The "Derbetans," who at firſt had their paſturages in the region of the Koko-noor, removed thence, on account of the Mongolian diſturbances, towards the Irtiſh, and, on that occaſion, ſplit into two parties. One of them united with the Soongares, in whoſe fortunes and final diſſolution it was involved; and the other proceeded weſtward with the Torgots towards the Yaik (now Ural) as far as the Volga and the Don, where it completely ſettled. In 1723 they removed to the parts beyond the Don; and afterwards joined the Torgots on the Volga. The "Torgots" ſeem to have formed themſelves into a particular horde much later than the other Kalmuck branches. Removing from the reſtleſs Soongares, they marched weſtward to the Steppes on the Volga, and there ſettled, receiving from the Ruſſians the appellation of the Volgaic Kalmucks. In the year 1761 the Ruſſian government came to an agreement with this rich and powerful horde, which reſtricted the authority of the khan to narrower bounds, and excited ſuch diſcontents, that they returned in great numbers in 1770 and 1771, over the ice of the river Ural, acroſs the Kirghiſian Steppe, into the Soongarey. The whole amount of the Kalmucks that remained in Ruſſia was eſtimated, ſome few years ago, at ſomewhat more than 20,000 tents. Theſe are the remains of all the four hordes; but the Khoſchotes, the Soongares, and Torgots, who remained and are diſtributed among the Derbets, have, beſides ſeveral petty princes, a khan preſiding over them. They wander, with their flocks and herds, in the ſteppes between the Don and the Volga, from the line of Tzaritzin as far as Caucaſus; and between the Volga and the river Ural, from the Irghis quite to the Caſpian; that is, in the governments of Saratof and Aſtrachan, and in the ſeats of the Coſſacks of the Don. In addition to theſe there is ſtill a numerous colony of "baptized Kalmucks." Towards the cloſe of the 17th century, many, among the diſtinguiſhed and noble, profeſſed themſelves of the Chriſtian faith. In the year 1737 the government eſtabliſhed them in a fruitful region about the rivers Samara, Sok, and Tok (in the preſent government of Simbirſk and in the Orenburg diſtrict of the government of Ufa), and granted them alſo the city of Stavropol, which is now a chief town of the government of Simbirſk. The increaſe of this colony was ſo conſiderable, that in the year 1771 they could reckon nearly 14,000 heads, whereas in 1754 they were only 8695. There is yet ſubſiſting in the government of Ufa a ſmall colony of "Mohammedan Kalmucks," which originated from individual proſelytes made by the Kirghiſes and adopted by that body.

The Chineſe empire has been lately extended in Tartary by the celebrated conqueſt of the kingdom of the Eleuthes, made in 1759 by the arms of the emperor "Kien-Long," who had been 46 years on the throne of China. The whole nation of the Eleuthes, known in Europe and Ruſſia by the name of Kalmucks, may be divided (ſays Groſier) into three branches, which have all proceeded from the ſame ſtem. The moſt weſterly (now the moſt numerous and powerful) occupy the country contained between the Caſpian ſea, Muſcovy, Samarcand, and Caſhgar, and which extends towards the eaſt as far as a vaſt chain of mountains, ſuppoſed to be a continuation of Caucaſus. Every year during winter theſe Tartars encamp on the ſhore of the Caſpian ſea, near Aſtrachan, where they carry on a great trade. The ſecond diviſion of the Eleuthes inhabit to the eaſt, from the chain of mountains now mentioned, as far as another chain of lofty mountains, the moſt conſiderable of which are called "Altai," in which are the ſources of the Oby and Irtiſh. The country which theſe people inhabit is very extenſive; ſince it borders on the north with Muſcovy, and on the ſouth with the territories of the Uſbeck Tartars; theſe are the people whom Kien-Long has conſtrained to ſubmit to the Chineſe government. The third branch of the Eleuthes inhabit to the weſt of China; they are the Tartars of Kokonor, who have been for a long time ſubjects of the empire. They are ſeparated from the province of Chen-ſi by lofty mountains. They take their name from a lake in this country, called in their language "Kokonor," and which is one of the largeſt in Tartary. They are ſubject to eight princes, who are independent of each other, and who are all of the race of the khan of the Eleuthes Tartars. Theſe people derive their principal riches from the gold which is found mixed with the ſand of their rivers, and above all with that of "Altangkol," or the Golden river. The gold-duſt which it furniſhes is the principal revenue of the princes of Kokonor, who employ their vaſſals during ſummer in collecting it. One of the principal articles of the trade of Kokonor is a kind of napped woollen ſtuff, called "pou-lou;" it is manufactured by theſe Tartars, who have the art of dyeing it in different colours; long dreſſes are made of it in the country, and it is generally uſed at Pe-king for covering ſeats. The famous Hoang-ho, or the Yellow river, has its ſource in this corner of Tartary.

The Kalmucks of Aſiatic Ruſſia are divided into three ranks; the nobility, whom they call white bones; the common people, who are bondmen, and denominated black bones; and the clergy, deſcending from both, who are free. In like manner, the noble ladies are called white fleſh; and the common women black fleſh; but pedigrees are only reckoned by the bones. The power of the "Taidſha," or chief prince, conſiſts ſolely in the number and opulence of his ſubjects; territory being of no eſtimation in ſo wide a region. Theſe ſubjects form an "Oluſs," divided into "Imaks," from 150 to 300 families; each Imak being commanded by a "Saiſſan," or noble. If there be a great khan, or emperor, the princes are only guided by him in affairs of general importance. The tribute is about a tenth part of the cattle, and other property; but on the firſt ſummons every man muſt appear on horſeback before the prince, who diſmiſſes thoſe who are unfit for the fatigues of war. The weapons are bows, lances, and ſabres, and ſometimes fire-arms; and the rich warriors are clothed in mail of interwoven rings, like that uſed in Europe till the 15th century. But they cannot oppoſe regular armies, and are apt even to diſorder that of their allies. Tooke's View of the Ruſſian Empire, vol. i. Groſier's China, vol. i.

KALMUNZ, a town of Bavaria, in the principality of Neuburg, at the conflux of the Vilz and the Nab; 12 miles N.N.W. of Ratiſbon.

KALNICK, a town of Ruſſian Poland, in the palatinate of Braclaw; 16 miles E.N.E. of Braclaw.

KALO, a town of Hungary, fortified with a moat and baſtions; 21 miles S.E. of Tokay.

KALOMBA, a town on the N. coaſt of the iſland Cumbava. S. lat. 8° 9'. E. long. 118°.

KALOUKE, a town on the W. coaſt of the iſland Celebes. S. lat. 2° 11'. E. long. 119° 15'.

KALPA, in *Hindoo Chronology*, an imaginary period, at the end of which all things are abſorbed in the Deity; it ſeems to mean a creation or formation. "The Hindoos ſay that it has been revealed, that from the beginning to the end of things, when the whole creation will be annihilated and abſorbed into the Supreme Being, there will be five great kalpas, or periods. We are now in the middle of the fourth kalpa, fifty years of Brahma being elapſed, and of the remainder the firſt kalpa is begun. Theſe five great kalpas include five hundred years of Brahma, at the end of which nothing will remain but Brahm, or the Self-exiſting. Every kalpa, except the firſt, is preceded by a renovation of the world, and a general flood. Theſe five kalpas have five deities, who rule by turns; and from whom the kalpas are denominated. Theſe five deities are Devi (or Parvati), Surya or the Sun, Ganeſa, Viſhnu, and Iſwara or Siva. Brahma has no particular kalpa: he is intimate to them all. Each deity, in his own period, is called Kalſva-rupi, meaning with the *countenance* of Kal, or Time; or Chronus, as weſtern mythologiſts would ſay; they having ſeveral ruling deities of that name. We are now under the reign of the fourth, Chronus, or in the kalpa of Viſhnu; who to *create*, thought on Brahma to *preſerve*; he foſters the whole creation in his own character, and he will ultimately *deſtroy* it through the intervention of Rudra, or Siva. It is declared in the Puranas, that all animals and plants are the linga or phallus of the preſiding Kalſva-rupi deity, and that at the end of his own kalpa, he is deprived of his ling by his ſucceſſor, who attracts the whole creation to himſelf, to ſwallow it up, or devour it, according to weſtern mythologiſts; and at the end of his kalpa he diſgorges the whole creation. Such is the origin of Chronus devouring his own offspring; of Jupiter diſgorging it, through a potion adminiſtered to him by Metis, and of Chronus caſtrating his own father." Moor's Hindoo Pantheon. (See Kal.) We ſhall extract no farther on this abſtruſe point of Hindoo metaphyſics, in the conſideration of which great difficulties are neceſſarily interpoſed.

KALPA-DRUMA, the name given by Hindoo fabuliſts to a tree, ſituated in the garden of Indra, called Nandana, which, as well as others, yield all that is deſired of it. See Indra.

KALSCHARPOVI, in *Geography*, a town of Ruſſia, in the government of Ufa; 28 miles S.E. of Burguruſlanſk.

KALSOE, one of the Faroer iſlands.

KALTENBERG, a town of Bohemia, in the circle of Konigingratz; 20 miles N.W. of Gitſchin.

KALTENBRUNN, a town of the duchy of Courland; 24 miles E. of Seelburg.—Alſo, a town of Bavaria, in the principality of Sulzbach; 12 miles N.E. of Sulzbach.

KALTENSTEIN, a town of the biſhopric of Paſſau; 10 miles N. of Paſſau.

KALTHOF, a town of Pruſſia, in the province of Smaland, near Konigſberg.

KALUA, a town of Pruſſia, in Pomerelia; 8 miles E. of Marienburg,

KALUADA, a town of the Arabian Irak, on the Tigris; 10 miles S.E. of Bagdad.

KALUBBLUB, a ſmall iſland in the Eaſt Indian ſea, near the S.W. coaſt of Mindanao. N. lat. 6° 46'. E. long. 121° 32'.

KALUGA, a city of Ruſſia, and capital of a government, called "Kalatſkoe," or "government of Kaluga," ſituated on the Occa; a place of conſiderable trade, and one of the moſt populous between Cherſon and Moſcow. N. lat. 54° 28'. E. long. 36° 2'.

KALVOLA, a town of Sweden, in the province of Tavaſtland; 12 miles N.W. of Tavaſthus.

KALUOT, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 21'. E. long. 21° 39'.

KALUTSKOE, or *Government of Kaluga*, a government of Ruſſia, bounded on the N. by that of Moſcow, E. by thoſe of Moſcow and Tula, S. by Orlovſkoe, and W. by Smolenſkoe, about 140 miles long, and from 30 to 90 broad, divided into 12 diſtricts. See Kaluga.

KAMA. See Kamma.

Kama, a ſmall iſland in the N. ſea, near the coaſt of Lapland; 10 miles N. of Suroe.

Kama, in *Hindoo Mythology*, is the god of love. "The Hindoo god," ſays ſir W. Jones, "appears evidently the ſame with the Grecian Eros, and the Roman Cupid: but the Indian deſcription of his perſon and arms, his family, attendants, and attributes, has new and peculiar beauties. According to the mythology of Hindooſtan, he was the ſon of Maya, or the general *attracting* power, (ſee Maya,) and married to *Reti*, or Affection; and his boſom friend is *Vaſanta*, or Spring. (See theſe articles.) He is repreſented as a beautiful youth, ſometimes converſing with his mother and conſort in the midſt of his gardens and temples, ſometimes riding by moonlight on a parrot, or *luri*, and attended by dancing girls or nymphs, the former of whom bear his colours, which are a *fiſh* on a *red* ground. His favourite place of reſort is a tract of country round Agra, and principally the plains of Matra; where Kriſhna alſo and the nine Gopea (ſee Kriſhna), who are clearly the Apollo and Muſes of the Greeks, uſually ſpend the night, in muſic and dancing. His bow of ſugar-cane or flowers, with a ſtring formed of bees, and his five arrows, each pointed with an Indian bloſſom of a heating quality, are equally new and beautiful. He has more than twenty names: that of Kam, or Kama, ſignifies deſire, a ſenſe which it alſo bears in ancient and modern Perſian." Kamdeo is a more popular way of expreſſing his name. He is alſo called Makara-ketu, alluding to the fiſh in his banner, which is ſaid to be the name of the horned ſhark: Makara is alſo the zodiacal ſign Capricorn. Kandarpa, meaning *love*, is another of his names; and Puſhpa-danva, or with a *bow of flowers*. Mara is another. Ananga means the incorporeal, derived from a very popular fable of Kama having been reduced to a mental eſſence by Siva; thus related in the Ramayana, b. i. ſect. 22. "Kandarpa, the wily one, wounding St'hanu, the lord of the gods, while, with uplifted arm, he was engaged in ſacred auſterities, met the deſert of his crime from the eye of the great Rudra—all his members, being ſcorched with fire, fell from his body: he was thence called Ananga (bodileſs) and the place where it happened Kama (deſire)." His name of Smara, the ideal, may refer to his mother Maya, meaning illuſion. Madan, Madamat, and Makadamat, major Moor, from whoſe Hindoo Pantheon this article is taken, deems derived from a root ſignifying *ſweetneſs* and *intoxication*, or pleaſurable merriment, but not approaching to drunkenneſs. Kama is ſaid to have been the ſon of Kriſhna and Rukmeni, that is, incarnated in a ſon of theirs, and then named Pradyamna, the adventures of whoſe ſon Anirudha with the beautiful Uſha are the ſubject of a pretty tale, and a very intereſting drama.

The banner of Kama, a fiſh on a red ground, and his *vahan*, or vehicle, the parrot, or *luri*, have doubtleſs their alluſions; the former poſſibly, as major M. conceives, to the ſtimulating nature of that ſpecies of food ſtirring the blood to aid Kamdeo's ends; and perhaps the enſanguined colouring, and extreme beauty of the *luri*, and, like the fiſh (and the dove of weſtern mythologiſts) its ſuppoſed *aphrodiſiac* tendency as food, may have had a ſhare in guiding a ſelection of attributes for the ardent deity. The ſoft affection and fabled conſtancy of the dove may have weighed with the Greeks; although conſtancy may not, perhaps, in ſtrictneſs, be a characteriſtic of love.

Sir William Jones has addreſſed a ſpirited hymn to this deity. The following ſtanza deſcribes Vaſanta preparing the bow and ſhafts for his miſchievous friend. The flowers with which the five arrows are tipped are of a heating inflaming quality, denoting that it is through the ſenſes that love's ſhafts are felt.

"He bends the luſcious cane, and twiſts the ſtring
With bees; how ſweet! but ah! how keen their ſting!
He with five flow'rets tips thy ruthleſs darts,
Which through five ſenſes pierce enraptured hearts:
Strong Champa, rich in odo'rous gold;
Warm Amer, nurs'd in heavenly mould;
Dry Nakeſer, in ſilver ſmiling;
Hot Kitticum our ſenſe beguiling;
And laſt, to kindle fierce the ſcorching flame,
Loveſhaft, which gods bright Bela name."

The Champa or Chumpa, or more correctly Champaka, is a polyandrian polygynian flower, the michelia of European botaniſts; it is of two ſorts, white and yellow; ſmall, and in its foliage like an expanded roſe-bud. Gardeners make and expoſe for ſale, chaplets and long ſtrings of the bloſſom, which looſe women, on the ſuppoſition that its fragrance excites favourable ſenſations in the votaries of Kama, decorate their hair with, and wear round their necks: its fragrance is, however, ſo potent, that nerves unaccuſtomed to it can ſcarcely bear it within doors. Another flower, called *mugry*, is of the ſame deſcription, and may, perhaps, be one of thoſe claſſically named in the hymn. The odour of the champa is ſo ſtrong, that bees are ſaid not to extract honey from it; a circumſtance that could not eſcape the keen eye of the Hindoo poets, and they accordingly imagine the champa to be ſadly mortified at the neglect. They have, however, conſoled it by dedicating it to Kriſhna, the black deity; as they, contrary to the notion of ſome European naturaliſts, conſider the union of yellow and black as peculiarly beautiful. The champa is farther conſoled by the preference it has obtained in bedecking the gloſſy locks of black-haired damſels, as juſt noticed; and in the following ſtanza, literally tranſlated from the Sanſcrit:

"That thou art not honoured by the ill-diſpoſed bee, why, O Champaka! doſt thou ſo heavily lament. The locks of lotas-eyed damſels, reſembling the freſh dark clouds adorning the ſky; let theſe embelliſh thee."

The Amer, mentioned in the extract from the hymn, is alſo called *amra*, and *amla*, and is ſaid by ſome to be the *mango* flower. Dry Nakeſer is a handſome flower with white and yellow petals. The Bela is a beautiful ſpecies of jaſmine.

Among a refined people, advantageouſly ſituated in a low latitude, we naturally expect to find love, in all its vaſt variety of relations, no inconſiderable proportion of their occupation and amuſement. Books and tales on amatory topics are very abundant in India, and in common life alluſions are conſtantly occurring to Kama and his excitations. The ode, tranſlated from the Sanſcrit, with which we ſhall conclude this article, is a popular canticle on a feſtival held at the full moon of the month Chaitra, in honour of Kamadeva, attended by muſic, bathing, and feſtive jollity. It muſt be recollected that Kama was incarnated as a ſon of Kriſhna, who being Viſhnu is called by one of his names, Madhava, in the ſecond ſtanza. The three firſt ſtanzas conſiſt chiefly of compound words forming names of Kama, for inſtance, Puſhpa-danva, with a flowery-bow; Makaraketa, fiſh-bannered, &c.

1. "Hail, god of the flowery bow! Hail, warrior, with a fiſh on thy banner! Hail, powerful divinity, who cauſeth the firmneſs of the ſage to forſake him, and ſubdueſt the guardian deities of the eight regions!

2. "O Kandarpa! thou ſon of Madhava. O Mara! thou foe of Sambara. Glory be to thee who loveſt the goddeſs Reti: who ſpringeſt from the heart.

3. "Glory be to Madana; to Kama; to him who is formed as the god of gods; to him, by whom Brahma, Viſhnu, Siva, Indra, are filled with emotions of rapture!

4. "May all my mental cares be removed! all my corporeal ſufferings terminate! May the object of my ſoul be attained, and my felicity continue for ever." Hin. Pan. p. 451.

KAMA-DHENU, } names of *Surabhi*; which ſee.
KAMA-DHOK, }

KAMAK, in *Geography*, a town of Turkiſh Armenia, on the Euphrates; 10 miles S.S.W. of Arzingen.

KAMAKURA, a town of the iſland of Niphon, in the gulf of Jedo. N. lat. 35° 10'. E. long. 139° 40'.—Alſo, an iſland of Japan, near the S. coaſt of Niphon, about three miles in circuit, having its coaſts ſo precipitous, that a crane is uſed to raiſe the freight from the boats. This is uſed as a ſtate priſon.

KAMAL, or KAMALA, the Sanſcrit name of the lotus, a plant eſteemed by the Hindoos, as well as by the ancient Egyptians, as very ſacred and myſterious. See LOTUS, or NYMPHÆA, or whatever word under which Egyptian ſuperſtition, connected with the lotus, may be noticed. We ſhall give a ſhort article under LOTUS. An extenſive claſs of Hindoo philoſophers, being Neptuniſts,

tuniſts, look on this aquatic plant with profound reverence; being more eſpecially the ſymbol of humidity; and Viſhnu being a perſonification of water, his worſhippers deem it his emblem alſo. It is farther the name of his conſort Lakſhmi, who, in her character of Venus, generally holds in her hand the lotus, the emblem alſo of beauty, and denoting her aquatic origin. (See Lakshmi, and Lotus.) There is no end of myſtical ſymboliſm connected with alluſions to the lotus among Hindoo mythologiſts. Of theſe many occur in Moor's Hindoo Pantheon. See the index under Kamal and Lotus. Many engravings are likewiſe there given of this ſubject in various combinations.

KAMALADAN, in *Geography*, a bay on the S. coaſt of the iſland of Mindanao. N. lat. 7° 21′. E. long. 121°.

KAMALAVA, a town of Perſia, in Chuſiſtan; 25 miles W. of Toſtar.

KAMALA-YONI, in *Hindoo Mythology*, a name of Brahma, derived, it would appear, from the ſymbols of Lakſhmi and Devi, or Parvati, the conſorts reſpectively of Viſhnu and Siva. The kamal is the lotus, an emblem of female beauty, and a name of Lakſhmi; and the Yoni, the *pudendum muliebre*, moſt myſteriouſly contemplated by the votaries of Devi, as the myſtical matrix of nature, and as her ſymbol. It does not, however, clearly appear why theſe terms or things ſhould be conjointly applied to Brahma, the deities creative power. On the ſubjects of this article ſee Kamal, Lakshmi, Lotus, Linga, and Yoni, in this work, which are amply diſcuſſed in the Hindoo Pantheon.

KAMALIA, in *Geography*, a town of Africa, in Manding, the inhabitants of which are partly Pagans and partly Mahometans. Mr. Park, in his return home, was taken ill of a fever in this town. This ſevere and dangerous ſickneſs was owing to exceſs of fatigue, to viciſſitudes of weather, and to the various hardſhips which he encountered, being ſometimes plunged to the neck in rivers and ſwamps, and ſometimes loſt in woods and deſerts, without ſhelter, cloathing, or food. In this diſtreſſed condition, and whilſt he was waiting for a caravan with which he might purſue his journey towards the Gambia, he was hoſpitably entertained by a worthy negro, whoſe name was Karfa Taura, who not only undertook, for the value of one ſlave, to be paid on his ſafe arrival at the Gambia, not only to conduct him ſafe to Piſania, but to accommodate him in his houſe until the time of the caravan's departure. During the long interval of ſix months, not a murmur eſcaped the lips of Karfa, or of any of his wives, at the trouble and expence which their inmate, who was confined more than a month to his mat (his only bed), brought upon them. To the kind attention, the tender ſolicitude, the cheerful aſſiduity, and unwearied hoſpitality of theſe poor pagans, Mr. Park declared that he was indebted, not only for his ſafe return to Great Britain, but alſo for the preſervation of his life; and he gratefully acknowledges, that he made his friend Karfa but an inadequate return (though the beſt in his power), by preſenting him, on their arrival at the Gambia, with double the ſum which he had originally promiſed. Kamalia is diſtant about 40 geographical miles S.W. of Sibidooloo, and lies nearly midway between the Joliba and Senegal rivers. N. lat. 12° 46′. W. long. 6° 25′.—Alſo, a town of Africa, in the kingdom of Bambarra, on the Niger; 18 miles S.W. of Sego.

KAMAN, a town of Aſiatic Turkey, in Caramania; 27 miles N.W. of Kaiſarieh.—Alſo, an iſland in the Red ſea. N. lat. 27° 35′.—Alſo, a town of Walachia; 16 miles S.W. of Ruſei.—Alſo, the name given by Tavernier to the *Combam*, or *Commum*, of others, which is the frontier town of the Carnatic, towards Golconda, near the ſource of the river Gondegama, or Gandlecomma.

Kaman, in *Natural Hiſtory*, a name given by many authors to a ſtone found about the burning mountains, and at ſome times uſed to engrave ſeals on. It is deſcribed as a white ſtone, variegated with ſeveral colours.

KAMARIS, in *Geography*, a town of Aſiatic Turkey, in Natolia; 22 miles W. of Artaki.

KAMBALA, mountains of Thibet, between lake Jamdoo and the Sampoo river.

KAMBAMBA. See Cambamba.

KAMBELE, a town of Perſia, in the province of Mecran, on the ſea-coaſt; 120 miles S. of Kidge.

KAMBERG, a town of Bohemia, in the circle of Kaurzim; 12 miles S. of Beneſchov.

KAMCHADALS. See Kamstchatka.

KAMEH, a province of Candahar, lying W. of Cabul, N. of Cabul river, nearly oppoſite to Jalalabad.—Alſo, a river of Aſia, called *Cabul;* which ſee. It is formed of various ſtreams that iſſue from the northern mountains, and join in the diſtrict of Kameh, whence the confluent river receives its name, and which it communicates to the Cabul river during the remainder of its courſe.

KAMEINOI, a town of Ruſſia, in the government of Pſkov; 12 miles S.E. of Opogka.

KAMEL, George Joseph, in *Biography*, a jeſuit miſſionary, who lived at the end of the 17th century, and ſent various plants from the Philippine iſlands to the botaniſts of Europe. See Camellia.

KAMELEY, in *Geography*, a town of Africa, in Sennaar; 60 miles S. of Gerri.

KAMEN, a town of the duchy of Warſaw; 12 miles S.E. of Gneſna.

KAMENI. See Kammeni.

KAMENITZ, a town of Bohemia, in the circle of Bechin; 24 miles E. of Bechin. N. lat. 49° 21′. E. long. 14° 56′.—Alſo, a town of Moravia, in the circle of Iglau; 13 miles E. of Iglau.

KAMENIZ, a town of Bohemia, in the circle of Chrudim; 10 miles S. of Chrudim.

KAMENKA, a town of Ruſſia, in the government of Tobolſk; 120 miles E. of Eniſeiſk.

KAMENOI, a town of Ruſſia, in the government of Ochotſk, at the northern part of the Penzinſkaia gulf, containing about 400 inhabitants; 16 miles S. of Oklanſk.

KAMENSKAIA, a town of Ruſſian Tartary, in the country of the Coſſacks, on the Donetz; 122 miles N. of Azof.

KAMENSKOI, a town of Ruſſia, in the government of Archangel; 124 miles S.E. of Kola.—Alſo, a town of Ruſſia, in the province of Ekaterinburg, on the Iſet; 40 miles S.E. of Ekaterinburg.

KAMERAN, an iſland in the Red ſea, near the coaſt of Arabia, governed by a Dola, ſubordinate to the Dola of Loheia: the ſoil is fertile, and it has a good harbour, which affords refreſhment to veſſels that touch at it in their voyage from the Indies to Jidda. N. lat. 15° 6′. E. long. 42° 25′.

KAMERIE, a town of Arabia, in the province of Yemen; 48 miles S. of Saade.

KAMERINA, a town of Poland, in the palatinate of Kiev; 12 miles S.E. of Czyrkaſy.

KAMERITZ, a town of Bohemia, in the circle of Bechin; 16 miles N. of Fiſtritz.

KAM-HI, in *Biography*, emperor of China, was the grandſon of a Tartar prince, who conquered that country in 1644, and aſcended the throne in 1661. He had a great attachment to the arts and ſciences of the Europeans, and liberally patronized the miſſionaries. He was a good geographer, and directed the conſtruction of many maps and charts, yet ſo vain was he of the country over which he governed, that he would never ſuffer a map of the world to be laid before him unleſs China was repreſented therein as the centre. He died at the age of 71, in the year 1722.

KAMI, in *Geography*, a town of Japan, in the iſland of Niphon; 20 miles E.N.E. of Jedo.

KAMIABA, a town of Africa, in Manding. N. lat. 12° 32′. W. long. 6° 15′.

KAMIAMACONDA, a town of Africa, in the country of Jemarrow. N. lat. 12° 48′.

KAMIEN, a town of Poland, in the palatinate of Volhynia; 34 miles N. of Lucho.—Alſo, a town of Lithuania, in the palatinate of Wilna; 64 miles E. of Lida.

KAMIENEC, a town of Lithuania, in the palatinate of Brzeſc; 16 miles N.N.E. of Brzeſc.

KAMIENTSCHIK, a town of the duchy of Warſaw; 36 miles E.N.E. of Warſaw.

KAMIFSHELER, a town of Circaſſia, on the coaſt of the Black ſea; eight miles E.S.E. of Mamak.

KAMINIEC, a town of Ruſſian Poland, and capital of the palatinate of Podolia, having a caſtle built on a rock, and one of the beſt fortified places in Poland. Below it runs the river Smetricz, which falls into the Dnieſter. It has a Popiſh and Armenian biſhop reſident in the city; and here are alſo held a court of juſtice and provincial diet. The epiſcopal ſee was founded in 1375. Its college formerly belonged to the Jeſuits. The whole province is ſometimes called "Kaminiec:" 100 miles W. of Braclaw. N. lat. 48° 53′. E. long. 26° 45′.

KAMIONKA, a town of Poland, in Volhynia; 48 miles N.N.E. of Zytomiers.

KAMIR, a town of Perſia, in the province of Lariſtan; 60 miles E.S.E. of Lar.

KAMISCHIN, a town of Ruſſia, in the government of Saratof, on the Volga; 80 miles S. of Saratof.

KAMITNICZA, a town of Poland, in the palatinate of Braclaw, near the Dnieſter; 54 miles S. of Braclaw.

KAMITSKI, a town of Japan, in the iſland of Ximo; 28 miles E.S.E. of Kokara.

KAMMA, a river of Ruſſia, which is the largeſt of all thoſe that unite their ſtreams with the Volga. It riſes in the government of Perme, from the weſtern projections of the Ural chain, waters a ſmall part of the government of Viatka, flows through a large tract of the government of Perme, forms the border between the governments of Viatka and Ufa, and at Laiſheva, 60 verſts below Kazan, falls into the Volga; having terminated a courſe of 1000 verſts. By the Tartars it is called "Tſholman-Idel." For the tranſport of ſalt and iron, it is one of the moſt important rivers of the empire. This is chiefly effected by the Tchuſſovaiya and the Belaiya, two rivers of conſiderable magnitude, flowing into it on the left. Beſide theſe, the Kamma takes up a great number of other rivers, ſuch as, on the left, the Kolva, the Yaiva, the Koſva, and the Ik; on the right, the Obva, the Okhau, and the Umyak. The Kamma, above the mouth of the Belaiya (which is of a whitiſh water), has a blackiſh wholeſome water. It is moſtly attended by a ridge of mountains, conſiſting of ſand, gypſum, and marle, with foreſts of firs and oaks. It is tolerably well ſtored with fiſh; and they are reckoned better taſted than thoſe of the Volga.

KAMMAGOJAH, a town of Africa, in the country of Quoja.

KAMMAH, a town of Aſia, and capital of a diſtrict in the kingdom of Birmah, on the Irawaddy; which carries on a large trade in teak timber, conveyed from hence to Rangoon; 15 miles N. of Prome.

KAMMENI, Great and Little, two iſlands of the Grecian Archipelago, ſo called on account of the nature of the calcined ſubſtances of which they are formed; the name denoting "burnt;" whence they have obtained the appellation of *Burnt* iſlands. The firſt of theſe roſe above the ſea in a ſurpriſing manner, whilſt the waters boiled up, and on account of its origin, which bordered on a prodigy, and which occaſioned it to be conſecrated by the ancients to the god of hell, it was denominated "Hiera." In the year 1743, during ſubterraneous commotions and convulſions, and various other terrifying phenomena, another iſland ſuddenly appeared above the ſurface of the waters. In order to diſtinguiſh it from the former, which is the larger, the Greeks have called it "Mikri Kammeni," or the Little Burnt iſland. Theſe iſlands are within about three miles W. of Santorin. N. lat. 36° 30′. E. long. 25° 24′. The Great Kammeni, which is the more ancient, is covered with a thin ſtratum of duſt, which allows a few herbs to grow upon it. The Little Kammeni, in which are viſible ſix craters, by which the volcano vomited forth the ſubſtances that compoſe it, is naked and barren. At the beginning of the laſt century a new iſlet appeared between the Great and Little Kammeni, about a league from Santorin. Its formation, accompanied with ſhocks of earthquakes, which were felt at Santorin, was gradual; and various circumſtances attended it, which are minutely deſcribed by Sonnini in his "Travels in Greece and Turkey."

KAMNIG, a town of Sileſia, in the principality of Neiſſe; 8 miles N.N.E. of Patſchkau.

KAMNITZ, or Chemnitz, a town of Bohemia, in the circle of Leitmeritz: the principal article of trade is the manufacture of ſtockings; 30 miles S.E. of Dreſden. N. lat. 50° 47′. E. long. 14° 32′.

KAMO, a town of Japan, on the ſouth coaſt of the iſland of Jedo.

KAMOETER, a ſmall iſland in the Eaſt Indian ſea. S. lat. 6° 30′. E. long. 132° 5′.

KAMOURASKAS, a town of Canada, on the right bank of the St. Lawrence. N. lat. 47° 33′. W. long. 69° 40′.

KAMRAJE. See Cashmere.

KAMSCHEVSKA, a town of Ruſſia, in the province of Ekaterinburg, on the Iſet,; 52 miles S.E. of Ekaterinburg.

KAMSCHLOV, a town of Ruſſia, in the province of Ekaterinburg; 56 miles E. of Ekaterinburg.

KAMSIN, hot ſoutherly winds of Egypt, where they are known under the general name of "winds of fifty days." (See Egypt.) Theſe winds have been mentioned by travellers under the denomination of "poiſonous" winds, or, more correctly, "hot winds of the deſert." By the Arabs of the deſert they are called "Semoum," or poiſon; and by the Turks "Shamyela," or wind of Syria, from which is formed the "Samiel" wind. The heat of theſe winds is ſometimes ſo exceſſive, that it may be compared to the heat of a large oven at the moment of drawing out the bread. When they begin to blow, the atmoſphere aſſumes an alarming aſpect. The ſky, which at other times is clear in this climate, becomes dark and heavy; the ſun loſes its ſplendour, and appears of a violet colour. The air is grey and thick, and filled with an extremely ſubtle duſt, which is univerſally penetrating. This wind increaſes gradually in heat in proportion to its continuance; and its effects are felt by all animated beings. The lungs are contracted and become painful. Reſpiration is ſhort and difficult, the ſkin becomes parched and dry, and the body is conſumed by an internal heat. Large draughts of water afford no relief, nor can any thing reſtore perſpiration. Marble, iron, water, though the ſun no longer appears, are hot. The ſtreets are deſerted, and the dead ſilence of night prevails every where. The inhabitants of towns and villages ſhut themſelves up in their houſes, and thoſe of the deſert in their tents, or in pits dug in the earth, waiting the termination of this deſtructive heat. It uſually laſts three days, but if it exceeds that time, it becomes inſupportable. The danger is moſt imminent when it blows in ſqualls, for then the heat is ſo much increaſed, as to cauſe ſudden death by ſuffocation. This wind is peculiarly fatal to perſons of a plethoric habit, and to thoſe that are exhauſted by fatigue. The corpſe manifeſts ſigns of that putrid fermentation, which takes place in animal bodies when the humours become ſtagnant. Theſe accidents are to be avoided by ſtopping the noſe and mouth with handkerchiefs; and the camels bury their noſes in the ſand, and keep them there till the ſquall is over. Another quality of this wind is its extreme aridity; which is ſuch, that water ſprinkled on the floor is evaporated in a few minutes: it withers and ſtrips all the plants, and exhales too ſuddenly the emanations from animal bodies, and produces that feveriſh heat which reſults from ſuppreſſed perſpiration.

Theſe hot winds are not peculiar to Egypt, they blow likewiſe in Syria; more frequently, however, near the ſea, and in the deſert, than in the mountains. M. Niebuhr met with them in Arabia, at Bombay, and in the Diarbekir: they are alſo known in Perſia, and in the eaſt of Africa, and even in Spain, and though their direction may vary, their effects are ſimilar. In Egypt, the moſt violent proceed from the S.S.W.; at Mecca, from the E.; at Surat, from the N.; at Baſſora, from the N.W.; from the W. at Bagdad; and in Syria from the S.E. They always proceed, ſays Volney, from deſert continents; and he adds, it is natural that the air which covers the immenſe plains of Lybia and Arabia, meeting there with neither rivulets nor lakes, nor foreſts, but ſcorched by the rays of a burning ſun, increaſed in intenſity by the reflection of the ſand, ſhould acquire a prodigious degree of heat and aridity; hence he infers that theſe qualities are owing to the heat of the ſun upon the ſands. Volney's Travels in Egypt, &c. vol. i.

KAMTSCHATKA, a river of Ruſſia, in the peninſula of that name. See below.

Kamtschatka, a peninſula of Ruſſia, in the government of Irkutſk, deriving its name from the river Kamtſchatka, which is ſuppoſed to have been ſo called from ſome brave warrior named Konſata. It is bounded on the N. by the province of Ochotſk, on the E. and S. by the Northern Pacific ocean, and on the W. by the ſea of Ochotſk, and the Penſhinſkoe gulf. On the ſouthern promontory, the Kurilly iſlands are included in it, and towards the weſt it is connected with North America by the Aleutan iſlands. This country conſiſts of a chain of mountains, forming one train with the very mountainous and rocky iſlands of Kurilly and Japan, and theſe again ſeem to be connected with the mountains that reach from Thibet through China. All theſe countries and iſlands ſeem to have ariſen by ſubterraneous fires, which ſtill continue to act, much more lately than Siberia. The peninſula of Kamtſchatka, according to the account given of it by captain King, who viſited it in October 1779, lies on the eaſtern coaſt of Aſia, running nearly N. and S. from 52° to 61° N. lat.; the longitude of its ſouthern extremity being 156° 45′. E. The iſthmus which joins it to the continent on the N. lies between the gulf of Olutorſk, and the gulf of Penſhinſk. Its ſouthern extremity is cape Lopatka, a word ſignifying the blade-bone of a man, and ſo called from its ſuppoſed reſemblance to it. The ſhape of the whole peninſula is not unlike that of a ſhoe, widening from the toe, that is cape Lopatka, towards the middle, and again narrowing towards the heel, the neck of land above-mentioned connecting it with the continent. Its greateſt breadth is from the mouth of the river Tigil to that of Kamtſchatka, and is computed to be 236 miles, from whence it narrows very gradually towards each extremity. It is bounded on the N. by the country of the Koriaks, from which it is ſeparated, according to the Ruſſian geographers, by Olutorſkoi-noſs, which is the ſouthern boundary of the Koriaki country. A chain of high mountains ſtretches through the whole length of the country from N. to S.; dividing it nearly into two equal parts, from which a great number of rivers take their riſe, and empty themſelves, on each ſide, into the Pacific ocean, and the ſea of Ochotſk. There are three rivers of much greater magnitude than the reſt; the "Bolchoireka," or great river, the "Kamtſchatka," and the "Awatſka." The firſt diſcharges itſelf into the ſea of Ochotſk, and is navigable for the Ruſſian galliots, upwards of five leagues from its mouth, or within nine miles of Bolcheretſk, a town ſituated at the conflux of the Goltſoſſka and the Biſtraia, which here loſe themſelves in the Bolchoireka. The Biſtraia, which is no inconſiderable river, has its ſource in the ſame mountain with the Kamtſchatka, and, by taking a direct contrary courſe, affords the Kamtſchadales the means of tranſporting their goods by water, in ſmall canoes, almoſt acroſs the whole peninſula. The river Kamtſchatka, after purſuing a courſe of nearly 300 miles from S. to N., winds round to the eaſtward, in which direction it empties itſelf into the ocean, a little to the ſouthward of Kamtſchatkoi-noſs. Near the mouth of the Kamtſchatka, to the N.W. lies the great lake, called Nerpitſch, from "nerpi," a Kamtſchadale word, ſignifying a ſeal, with which this lake abounds. About 20 miles up the river, reckoning from the mouth of the lake, is a fort called Niſhnei Kamtſchatka Oſtrog, where the Ruſſians have built an hoſpital and barracks, and which is ſaid to have become the principal mart in this country. The river Awatſka riſes from the mountains ſituated between the Bolchoireka and the Biſtraia, and running, from N.W. to S.E., a courſe of 100 miles, falls into the bay of Awatſka. The Tigil is likewiſe a river of conſiderable ſize, riſing amidſt ſome very high mountains, which lie under the ſame parallel with Kamtſchatkoi-noſs, and running in an even courſe from S.E. to N.W. falls into the ſea of Ochotſk. The ſoil of this peninſula is extremely barren, and ſeems to be incapable of profitable cultivation, either in the way of paſturage, or in any other mode.

The face of the country, in general, is thinly covered with ſtunted trees, having a bottom of moſs, mixed with low weak heath, and bears a more ſtriking reſemblance to Newfoundland than to any other part of the world which Capt. King had ever ſeen. He was informed, however, by major Behm, the late governor, that many parts of the peninſula, particularly the banks of the river Kamtſchatka and the Biſtraia, produce graſs of great height and ſtrength, which they cut twice in the ſummer; and that the hay is of a ſucculent quality, and particularly well adapted to the fattening of cattle. From other accounts it appears that there is no part of the country equal in fertility to that which borders on the river Kamtſchatka; and that to the N. and S. it is much inferior both in point of ſoil and climate. Repeated experiments have been made in the culture of oats, barley, and rye, in different quarters near this river, which have generally ſucceeded; and it is not doubted, that wheat, in many parts, particularly near the ſource of the Biſtraia and Kamtſchatka, would grow as well as in the generality of countries ſituated in the ſame latitude. The fertility of this part of the country may probably be owing to its being the wideſt interval of the peninſula, and conſequently moſt remote, on each ſide, from the ſea: whereas the chilling fogs and drizzling weather, which prevail almoſt perpetually along the coaſt, muſt neceſſarily render the parts adjacent very unfit for all the purpoſes of agriculture. The ſeverity of the climate, we may naturally conclude, muſt correſpond to the ſterility of the ſoil, of which it is probably the cauſe. The firſt time, ſays Capt. King, we ſaw this country, was in the beginning of May 1779, when the whole face of it was covered with ſnow, from ſix to eight feet deep. On the 8th of May, at noon, the thermometer ſtood at 32°; and the ſnow lay ſo deep on the ground, that all attempts to cut wood were fruitleſs. On the 12th the thaw began to advance gradually; and in the beginning of June, the ſnow was generally melted from the lowlands. On the fifteenth of this month, the thermometer had never riſen higher than 58°, nor the barometer than 30° 4′. The S. E. wind was the moſt prevalent. On the 24th of Auguſt, the foliage of the trees and all ſorts of vegetation ſeemed to be in the higheſt ſtate of perfection. During this month and September, the weather was very changeable, but in no reſpect ſevere. The winds veered towards the weſt. The greateſt height of the thermometer was 65°, the loweſt 40°. The barometer's greateſt height 30°; its loweſt 29° 3′. So that, upon the whole, during this month, an equal and moderate degree of temperature prevailed. But at the beginning of October, the tops of the hills were again covered with new-fallen ſnow, the wind continuing weſterly. In computing the ſeaſons, the ſpring ſhould not be taken into the account. The interval from the middle of June to the middle of September may properly be ſaid to conſtitute the ſummer. October may be conſidered as an autumnal month; and from thence, to the middle of June, it is perfect winter. It is ſaid that the climate, in the country adjoining to the river Kamtſchatka, is not leſs ſerene and temperate than in many parts of Siberia that are under the ſame latitude. This variation, ſays Capt. King, is probably owing to the ſame cauſes, to which the ſuperior fertility of the ſoil in thoſe parts has been attributed.

The ingenious Mr. Kirwan, in his "Eſtimate of the Temperature of different Latitudes," ſtates the diſtance of Kamtſchatka from the Atlantic to be ſuch, that its temperature is not in any reſpect influenced by it, but rather by that of the North Pacific, to which it adjoins. Accordingly the northern parts of this peninſula enjoy the moſt moderate weather, being chiefly influenced by the North ſea, the temperature of which, even in winter, is milder than that of the ſea below the ſtraits that ſeparate Aſia from America. Speaking of the temperature of the North Pacific ocean, the ſame judicious author obſerves, that this part of it is contracted in latitude 66° to the narrow ſpace of 40 miles; and in latitude 52°, it occupies the ſpace of only 30° in breadth from eaſt to weſt, that is, about 1300 miles: whereas the Atlantic in latitude 52° is about 1700 miles in breadth, and is no where contracted to a leſs ſpace than 700 miles. To which we may add, that the coaſts of Aſia on one ſide, and thoſe of America on the other, are bordered with high mountains, covered with ſnow for a great part of the year; and numerous high iſlands lie ſcattered between both continents. From theſe circumſtances we have ſufficient reaſon for concluding *à priori*, that this ſea ſhould be much colder than that portion of the Atlantic contained between the ſame parallels: for, during the winter, the mountains that line the coaſts are cooled to a much greater degree than the flat coaſts of the Atlantic; and the ſea, where it is narrow, is entirely frozen: in ſummer, heaps of ice, being long ſheltered from the ſun by the iſlands, are carried down into lower latitudes, and the ſnow remains long unmelted on the mountains; ſo that Mr. Kirwan is inclined to think, that the annual temperature of it is at leaſt 4 degrees below that of the ſtandard in correſponding latitudes. But further obſervations are neceſſary for determining with preciſion the mean temperature of any of theſe parts. But it is not in the ſterility of the ground alone that the Kamtſchadales feel the unfavourable temperature of their climate; the uncertainty of the ſummer ſeaſon ſometimes prevents their laying up a ſufficient ſtock of dried fiſh for their winter's proviſion, and the moiſture of the air cauſes worms to breed in them, which not unfrequently deſtroy the greateſt part. The inhabitants of this country are very ſeldom troubled with ſtorms of thunder and lightning; and never but in a ſlight degree. The general ſeverity of the winter, as well as the dreadful hurricanes of wind and ſnow which that ſeaſon brings along with it, cannot be queſtioned, from the ſubterraneous habitations to which the natives are under a neceſſity of reſorting for warmth and ſecurity. Major Behm informed captain King and his companions, that the cold and inclemency of the winter of 1779 were ſuch, that, for ſeveral weeks, all intercourſe between the inhabitants was entirely obſtructed, every one being afraid to ſtir even from one houſe to another, for fear of being froſt-bitten. This extraordinary rigour of climate in ſo low a latitude may be accounted for, from its being ſituated to the eaſt of an immenſe uncultivated tract of country, and from the prevalence of the weſterly winds, blowing over ſo extenſive and cold a continent. The extraordinary violence and impetuoſity of the winds are attributed to the ſubterraneous fires, the ſulphureous exhalations, and the general volcanic diſpoſition of the country. This peninſula abounds in volcanos, of which only three have been, for ſome time paſt, ſubject to eruptions. One of theſe is ſituated in the neighbourhood of Awatſka. The volcano of Tolbatchick is ſituated on a neck of land between the river of Kamtſchatka and Tolbatchick. The mountain, from the ſummit of which the eruptions proceed, is of a conſiderable height, and terminates in pointed rocks. The third volcano is on the top of the mountain of Kamtſchatka, which is mentioned as the higheſt in the peninſula. A thick ſmoke never ceaſes to aſcend from its ſummit, and it has frequent eruptions of the moſt violent and dreadful kind; ſome of which were much talked of when captain King viſited the iſland, and ſeemed to be freſh in the memories of the Kamtſchadales. This country contains numerous ſprings of hot water, and extraordinary pits or wells, at the bottom of which the water ſeems to boil as in a cauldron with prodigious impetuoſity, accompanied with a dreadful noiſe, and diſcharging a thick vapour.

Near the village Milkova a merchant of Irkutſk, in 1760, diſcovered iron ore, and erected ſmelting houſes on the ſpot. Silver ore, though not very rich, is alſo ſaid to have been found in Kamtſchatka. Of the trees which fell under the notice of captain King and his aſſociates, the principal were the birch, the poplar, the alder, (with the bark of which they ſtain their leather,) many ſpecies of the willow, and two ſorts of dwarfiſh pines or cedars, of one of which they made their eſſence for beer, and it was found excellent for the purpoſe. The birch tree was the moſt common; and of this there were three ſorts, two of which are fit for timber, and the third, which is of a dwarfiſh kind, is applied to a variety of uſes. The liquor, yielded by it upon being tapped, is drank without any previous preparation; the bark is converted into veſſels for domeſtic purpoſes; and of the wood they make their ſledges and canoes. Beſides the trees above mentioned, there are the larch, and alſo firs, the ſervice-tree, and two ſpecies of the white-thorn. Of the ſhrub kind, as junipers, the mountain-aſh, roſe-trees, and raſpberry buſhes, the country produces great abundance; together with a variety of berries, which are collected at the proper ſeaſon, and preſerved by boiling them into a thick jam, without ſugar. Theſe are uſed as ſauce to their dried and ſalt fiſh; and are eaten by themſelves, in puddings, and various other ways; and decoctions are alſo made of them for their ordinary liquor. The country furniſhes many wholeſome vegetables in a wild ſtate, ſuch as wild celery, angelica, chervil, garlic, and onions; and upon ſome ſpots of ground in the vallies there are excellent turnips and turnip-radiſhes. They have alſo more recently cultivated potatoes. Major Behm exerted himſelf very laudably in endeavouring to promote agriculture and grazing, and not altogether without effect; and his ſucceſſor, Mr. Aſſeſſor Reinikin, continued theſe endeavours, inſomuch that, in 1782, fron 68½ pood of winter-rye 3416 ſheaves, and from 59¼ pood of barley 24,840 ſheaves, were reaped. Oats, wheat, and buck-wheat, were much injured by the early froſts; but hemp ſucceeds very well. There are two plants in this country that deſerve particular notice, on account of the extenſive uſe to which they are applied: one, called by the natives "Sarana," is the Lilium Kamſkatienſe flore atro rubente, of which Steller enumerates five different ſpecies. The roots are collected in the beginning of Auguſt, dried in the ſun, and laid up for uſe. When roaſted in embers, it ſupplies the place of bread; and baked in the oven and pounded, it becomes an excellent ſubſtitute for flour and meal of every ſort, and in this ſtate is mixed in all their ſoups, and moſt of their other diſhes. It is eſteemed very nouriſhing. The roots of this plant are alſo applied to ſimilar purpoſes at Oonalaſhka. The other plant is called the "Sweet graſs," the Heracleum Sibericum foliis pinnatis, &c. Hort. Upſal. 65. This plant was formerly a principal ingredient in the cookery of moſt of the Kamtſchadale diſhes; but ſince the Ruſſians have obtained poſſeſſion of the country, it is entirely appropriated to the purpoſes of diſtillation. The liquor obtained from it is of the ſtrength of brandy, and is called by the natives "raka." Two pood (72 pounds) of the plant yield generally one vedro (25 pints) of raka. There are ſeveral other plants, which we cannot enumerate. It is ſaid, that the Kamtſchadales (before their acquaintance with fire-arms) poiſoned their ſpears and arrows with the juice of the root of the "zgate" (anemonoides et ranunculus); and that wounds inflicted by them are equally deſtructive to land and marine animals. The Tſchutſki are reported to uſe the ſame drug for this purpoſe at preſent. Of the ſtraw of the "triticum radice perenni ſpiculis binis lanuginoſis," which grows abundantly along the coaſt, they make a ſtrong matting, which they uſe not only for their floors, but for ſacks, bed-clothes, curtains, and a variety of other domeſtic purpoſes. Of the plant called "bolotnaia," growing in the marſhes, and reſembling cyperoides, which is carded like wool, with a comb made of the bones of the ſea-ſwallow, they make various garments, which they uſe inſtead of linen and woollen cloths. The nettle ſupplies the place of hemp and flax, and ſerves in the manufacture of their fiſhing-nets.

The animals of this peninſula are the common fox, the ſtoat or ermine, the zibelline or ſable, the iſatis or arctic fox, the varying hare, the mountain rat or earleſs marmot, the weaſel, the glutton or wolverene, the argali or wild ſheep, rein-deer, bears, wolves, and dogs. The dogs are very numerous; and they are very uſeful in drawing the ſledges, which are the common vehicles of the country. The coaſt and bays of this country are frequented by almoſt every ſort of northern ſea-fowl; the rivers are ſtored with numerous flocks of wild ducks of various ſpecies. In the woods are eagles of a very large ſize; and of the hawk, falcon, and buſtard kind, there are great numbers. This country likewiſe affords wood-cocks, ſnipes, and two ſorts of grouſe, or moor-game. Swans are alſo very plentiful, and generally, in their entertainments, make a part of their repaſt. The ſea-coaſt furniſhes no amphibious animals, except ſeals, which ſwarm in the bay of Awatſka, where they purſue the ſalmon, that are collected there in ſhoals in order to aſcend the rivers. They are alſo found in moſt of the lakes, which communicate with the ſea. The ſea otters reſemble thoſe of Nootka ſound; but ſince the Ruſſians have opened a trade for their ſkins to China, where they are ſold at a price above that of any other kind of fur, they have been hunted almoſt entirely out of the country. Thoſe of the Kurile iſlands are of a ſuperior quality to thoſe of Kamtſchatka, or the American coaſt. Fiſh may be conſidered as the ſtaple article of food, with which providence hath ſupplied the inhabitants of this peninſula. Whales are frequently ſeen, both in the ſea of Ochotſk, and on the ſide of the eaſtern ocean, and when caught, are converted to various uſes. Of the ſkin they make the ſoles of their ſhoes, and ſtrops and thongs for various other purpoſes. The fleſh they eat, and the fat is ſtored up, both for kitchen uſe and for their lamps. The whiſkers are uſed for ſewing together the ſeams of their canoes, and for making nets; and with the under jaw-bones their ſledges are ſhod. They work the bones into knives; the inteſtines are cleaned, and blown like bladders, for containing their oil and greaſe; and of the nerves and veins, they make excellent ſnares. Flat-fiſh, trout, and herrings are abundant; the ſeaſon for the latter begins in May, and they do not remain long on the coaſt; they are fine and large. They have alſo cod of a large ſize; but their principal dependence is on ſalmon, which they lay up in ſtore for their winter proviſions. The ſeaſon of fiſhing, for this ſpecies, laſts from the middle of May till the end of June.

The preſent inhabitants of Kamtſchatka are of three ſorts; the natives, or Kamtſchadales; the Ruſſians and Coſſacks; and a mixture of thoſe two by marriage. The true Kamtſchadales, are, according to Steller, a people of very great antiquity, and have for many ages inhabited this peninſula; and he ſays, that they are originally deſcended from the Mungalians, and not either from the Tunguſian Tartars, as ſome, or the Japaneſe, as others have imagined. Many words, he ſays, in their language have terminations ſimilar to thoſe of the Mungalian Chineſe, and the ſame principle of inflexion or derivation obtains in both languages. They are, in general, under-ſized, as are the Mungalians; their complexion, like theirs, is ſwarthy; they have black hair, little beard, the face broad, the noſe ſhort and flat, the eyes ſmall and ſunk, the eye-brows thin, the belly pendant, the legs ſmall; all which are peculiarities that are to be found among the Mungalians. As the reſult of the whole he infers, that they fled for ſafety to this peninſula, from the rapid advances of the eaſtern conquerors; as the Laplanders, Samoieds, &c. were compelled to retreat to the extremities of the north by the Europeans. The Ruſſians, having extended their conqueſts, and eſtabliſhed ports and colonies along that immenſe extent of coaſt of the Frozen ſea, from the Jeneſei to the Anadyr, appointed commiſſaries for the purpoſe of exploring and ſubjecting the countries ſtill farther eaſtward. They ſoon became acquainted with the wandering Koriaks inhabiting the N. and N.E. coaſt of the ſea of Ochotſk, and without difficulty made them tributary. Theſe being the immediate neighbours of the Kamtſchadales, and likewiſe in the habit of bartering with them, a knowledge of Kamtſchatka followed of courſe. The honour of the firſt diſcovery is aſcribed to Feodot Alexeieff, a merchant, who is ſaid to have ſailed from the river Kovyma, round the peninſula of the Tſchutſki, in company with ſeven other veſſels, about the year 1648. Being ſeparated from the reſt by a ſtorm, near the Tſchukotſkoi-noſs, he was driven upon the coaſt of Kamtſchatka, where he wintered; and in the ſummer following coaſted round the promontory of Lopatka, into the ſea of Ochotſk, and entered the mouth of the Tigil; but he and his companions were cut off by the Koriaks, in endeavouring to paſs by land from thence to the Anadirſk. But as theſe diſcoverers did not live to report what they had done, Volodimir Atlaſſoff, a Coſſack, is reputed the firſt diſcoverer of Kamtſchatka. This perſon, under the quality of commiſſary, penetrated, in 1699, with about 60 Ruſſian ſoldiers, and the ſame number of Coſſacks, into the heart of the peninſula, gained the Tigil, and levying a tribute of furs, proceeded to croſs over to the river Kamtſchatka, on which he built the higher Kamtſchatka Oſtrog, called Verchnei, where he left a garriſon of Coſſacks, and returned to Jakutſk in 1700, with an immenſe quantity of rare and valuable tributary furs. Upon his arrival at Moſcow, he was appointed commander of the fort of Jakutſk, with farther orders to repair again to Kamtſchatka. But as he advanced towards the Anadirſk, he fell in with a bark on the river Tunguſka, laden with Chineſe merchandize, which he pillaged; but in conſequence of a remonſtrance from the ſufferers to the Ruſſian court, he was ſeized at Jakutſk, and thrown into priſon. During the diſgrace and trial of Atlaſſoff, ſeveral ſucceſſive commiſſaries were ſent into Kamtſchatka; but at length Atlaſſoff was reinſtated in his command, and appointed to conduct a ſecond expedition into Kamtſchatka; however, in this ſervice he was guilty of oppreſſion and cruelty, which occaſioned a mutiny among the Coſſacks, and they ſucceeded in getting him diſplaced, and ſeized upon his effects. Accuſtomed to plunder, they were reduced to military diſcipline and ſubjection with great difficulty. The hiſtory of this country, from that period till the grand revolt of the Kamtſchadales in 1731, preſents one unvaried detail of maſſacres, revolts, and ſavage ſanguinary rencounters between ſmall parties, from one end of the peninſula to another. When peace was eſtabliſhed, the country remained tranquil till the year 1740, when a few Ruſſians loſt their lives in a tumult; and except an inſurrection which occurred at Bolcheretſk in 1770, there has been no diſturbance ſince.

After the rebellion of 1731 was quelled, the country recovered itſelf, and became more populous than ever; when, in the year 1767, the ſmall-pox, brought by a ſoldier from Ochotſk, threatened the total extirpation of its inhabitants. It has been computed that near 20,000 died of this diſorder in Kamtſchatka, the Koreki country, and the Kurile iſlands. The inhabitants of whole villages were ſwept away, and their habitations left deſolate. In the diminiſhed ſtate of the natives, with freſh ſupplies of Ruſſians and Coſſacks perpetually pouring into the country, and intermixing with them by marriage, it is probable, that in leſs than half a century there will be very few of them left. According to major Behm's account, there were not, in 1779, more than 3000 who paid tribute, the Kurile iſlanders included. Capt. King underſtood that in the year above-mentioned, there were in the five forts of Nichnei, Verchnei, Tigil, Bolcheretſk, and St. Peter and St. Paul, about 400 Ruſſians and Coſſacks, and near the ſame number at Ingiga, which, though to the N. of the peninſula, was then under the commander of Kamtſchatka; to theſe may be added the Ruſſian traders and emigrants, whoſe number is not very conſiderable.

The Ruſſian government, eſtabliſhed over this country, though military, is in a high degree mild and equitable. The natives are permitted to chooſe their own magiſtrates among themſelves, in the way and with the ſame powers to which they had ever been accuſtomed. One of theſe, under the title of "Toion," preſides over each "oſtrog," who refers merely caſes of difficulty, or crimes of peculiar malignity, to the deciſion of the governor of Kamtſchatka. The Toion has likewiſe the appointment of a civil officer, called a corporal, who aſſiſts him in the execution of his office, and in his abſence acts as his deputy. By an edict of the late empreſs, no crime whatever can be puniſhed with death; but it is ſaid, that, in caſes of murder, the puniſhment of the "knout" is adminiſtered with ſuch ſeverity, that the offender generally dies under it. The only tribute exacted, as an acknowledgment of the Ruſſian dominion, conſiſts, in ſome diſtricts, of a fox's ſkin, in others of a ſable's, and in the Kurile iſles of a ſea-otter's. The tributes are collected by the Toions in their ſeveral diſtricts. The Ruſſians, it is ſaid, have taken great pains in converting the Kamtſchadales to Chriſtianity, and they have ſo far ſucceeded, that there remain few idolaters among them. The religion taught and profeſſed is, of courſe, that of the Greek church. Schools are likewiſe eſtabliſhed in many of the oſtrogs, where the children of both the natives and the Coſſacks are gratuitouſly inſtructed in the Ruſſian language.

The commerce of this country, as far as concerns the exports, is entirely confined to furs, and carried on principally by a company of merchants, inſtituted by the late empreſs. Beſides theſe, there are many inferior traders (particularly of the Coſſacks) ſcattered through the country. The principal merchants, during their ſtay in the country, reſide at Bolchereſk, or the Niſhnei oſtrog, in which two places the trade almoſt wholly centres. The articles of importation are principally European, but not reſtricted to Ruſſian manufactures; many are Engliſh and Dutch; ſeveral likewiſe come from Siberia, Bucharia, the Kalmucks, and China. They conſiſt of coarſe woollen and linen clothes, yarn ſtockings, bonnets, and gloves; thin Perſian ſilks; cottons, and pieces of nankeen, ſilk and cotton handkerchiefs; braſs coppers and pans, iron ſtoves, files, guns, powder, and ſhot; hardware, ſuch as hatchets, bills, knives, ſciſſors, needles, looking-glaſſes; flour, ſugar; tanned hides, boots, &c. It has been obſerved, that theſe articles in general are ſold for treble the price they might have been purchaſed for in England; and though the merchants have ſo large a profit upon theſe imported goods, they have a ſtill larger upon the furs at Kiachta, upon the frontiers of China, which is the great market for them. The beſt ſea-otter ſkins ſell generally in Kamtſchatka for about 30 roubles a-piece; at Kiachta the Chineſe merchant buys them at double that price, and ſells them again at Pekin at a conſiderable advance, where a profitable trade is made with ſome of them to Japan. All furs exported from Kamtſchatka acroſs the ſea of Ochotſk, pay a duty of 10 *per cent.* and ſables a duty of 12; and all ſorts of merchandize imported from Ochotſk pay half a rouble for every pood (36 pounds Engliſh). The duty on exports and imports is paid at Ochotſk; and the tribute, which amounted, in 1779, to 10,000 roubles annually, is collected at Bolcheretſk. Six veſſels, from 40 to 50 tons burthen, were employed by the late empreſs between Ochotſk and Bolcheretſk; five for the tranſportation of ſtores and proviſions from the former to the latter place, and one as a packet boat for conveying diſpatches. Beſides theſe, there are about 14 veſſels employed by the merchants in the fur trade, among the iſlands to the eaſtward. The moſt conſiderable and valuable part of the fur trade is carried on with the iſlands that lie between Kamtſchatka and America.

The houſes in Kamtſchatka are of three ſorts, *viz. jourts*, *balagans*, and *log-houſes*, called there *iſbas*. The firſt are their winter, and the ſecond their ſummer habitations; the third are altogether of Ruſſian introduction, and inhabited only by the better and wealthier ſort. A town of Kamtſchatka is called an "oſtrog," and conſiſts of ſeveral of the three ſorts of houſes above-mentioned; but the balagans are the moſt numerous. St. Peter and St. Paul conſiſts of ſeven log-houſes, 19 balagans, and three jourts. Paratounca is of about the ſame ſize. Karatchin and Natchekin contain fewer log-houſes, but full as many jourts and balagans as the former. The outermoſt garment of the men is of the ſhape of a carter's frock. Thoſe worn in ſummer are of nankeen; in winter they are made of ſkins, moſt commonly of the deer or dog, tanned on one ſide, the hair being left on the other, which is worn innermoſt. Under this is a cloſe jacket of nankeen, or other cotton ſtuff; and beneath that a ſhirt of thin Perſian ſilk, of a blue, red, or yellow colour. The remaining part of their dreſs conſiſts of a pair of tight trowſers, or long breeches, of leather, reaching down to the calf of the leg; of a pair of dog or deer-ſkin boots, with the hair innermoſt; and of a fur cap, with two flaps, which are generally tied up cloſe to the head, but in bad weather are let to fall round the ſhoulders. On ceremonious occaſions the Toions wear a fur dreſs. The dreſs of the women conſiſts of a full looſe robe of white nankeen, gathered cloſe round the neck, and faſtened with a collar of coloured ſilk. Over this they wear a ſhort jacket without ſleeves, made of differently coloured nankeens, and petticoats of a ſlight Chineſe ſilk. Their ſhifts, which have ſleeves down to the wriſts, are alſo of ſilk; and coloured ſilk handkerchiefs are bound round their heads, concealing entirely the hair of the married women, whilſt thoſe who are unmarried, bring the handkerchief under the hair, and ſuffer it to flow looſe behind.

The Kamtſchadales amuſe themſelves with ſinging and dancing. Their dancing they ſeem to have learned from the bears, which is intended to repreſent the awkward and clumſy geſtures of this animal. The body was always bowed and the hams bent, whilſt the arms were uſed in imitating the tricks and attitudes of that animal. Cook's Third Voyage, vol. iii. Took's Ruſſian Empire, vol. i. Cox's Ruſſian Diſcoveries.

KAMTSCHATKOI Noſs, the ſouthern cape of Kamtſchatka. N. lat 55° 3'. E. long. 163° 20'.

Kamtschatskoi, *Niznei* or *Lower*, a town or oſtrog of Ruſſia, on the E. ſide of the peninſula of Kamtſchatka, about 20 miles from the river Kamtſchatka; containing two churches and about 150 houſes, and having a citadel with magazines, an arſenal, guard-houſe, and barracks. It is the ſeat of two tribunals, one for matters of government, and another for thoſe of commerce; 142 miles E.S.E. of Ochotſk. N. lat. 56° 40'. E. long. 160° 14'.

Kamtschatkoi, *Verchnei* or *Upper*, a town or oſtrog of Ruſſia, in the peninſula of Kamtſchatka, governed by a ſerjeant, and containing about 600 houſes; 60 miles N.N.E. of Bolcheretſkoi. N. lat. 93° 50'. E. long. 157° 39'.

KAN, a river of Ruſſia, which runs into the Eniſei, near Bilchutzko, in the government of Kolivan.—Alſo, a river of China, which riſes in the S. part of Kiang-ſi, and runs into the lake Po-yang; 20 miles N. of Tchang.

Kan, or *Khan*. See Khan.

KANA, in *Geography*, a town of Arabia, in the province of Hed-jaz; 40 miles E.S.E. of Hajar.

KANAAP, a town of Hindooſtan, in Bahar; 47 miles S.S.W. of Patna.

KANADEI, a town of Ruſſia, in the government of Simbirſk; 72 miles S.S.W. of Simbirſk.

KANAGA, one of the Andreanoffkie iſlands, between Kamtſchatka and America, which has a high ſmoking mountain.

KANAHOODY, a town of Perſia, in the province of Coheſtan; 100 miles W.S.W. of Niſabur.

KANAKI, a ſmall iſland in the gulf of Engia, near the W. coaſt of Coluri.

KANAMBADDY, a town of Hindooſtan, in Myſore; 8 miles W. of Seringapatam.

KANAN, a town of Africa, in the kingdom of Cayor, near the Atlantic. N. lat. 16° 40'. W. long. 15° 55'.

KANANIKOLSKOI, a town of Ruſſia, in the government of Upha; 52 miles S.W. of Sterlitamatzk.

KANAR, a large lake, formed by an expanſion of the river Dewah, in the country of Kemaoon.

KAN-AREDMERD, a town of Perſia, in Farſiſtan; 90 miles S. of Schiras.

KANARNA, a town of European Turkey, in Bulgaria; 22 miles N.E. of Varna.

KANARY, a ſmall iſland in the Eaſt Indian ſea, ſurrounded by a number of iſlets, called by this name. S. lat. 1° 44'. E. long. 129° 54'.

KANAS, or Kangas, a town of Turkiſh Armenia; 60 miles S.E. of Erzerum.

KANASTER, is a name given in America to baſkets of ruſhes or cane, in which they put the tobacco which they ſend into Europe: hence ariſes the name of kanaſter tobacco, the beſt of which comes from Makaribou.

KANAZAVA, in *Geography*, a town of Japan, in the iſland of Niphon; 130 miles N.E. of Meaco.

KANCABA, a town of Africa, in the kingdom of Mandingo, ſeated on the Niger, a mart for ſlaves; 16 miles S.E. of Kamalia.

KANDA, a town of Africa, in the kingdom of Congo; 30 miles N.E. of St. Salvador.—Alſo, a town of Japan, in the iſland of Xicoco; 16 miles S.E. of Ovutſi.

KANDABAGA, mountains that form part of the boundary between Ruſſia and Chineſe Tartary, a part of the great chain W. of the river Oka. See Sayane *Mountains*.

KANDABIL, a town of Perſia in the province of Mecran, 285 miles S. of Candahar. N. lat. 28° 28'. E. long. 67° 20'.

KANDAL, a town on the N. coaſt of the iſland of Java. S. lat. 6° 48'. E. long. 110° 18'.—Alſo, a town of Abyſſinia, near the coaſt of the Red ſea. S. lat. 14° 30'. E. long. 41° 15'.

KANDALAKS, a town of Ruſſia, in the government of Archangel, on the N. coaſt of the White ſea; 140 miles S.S.E. of Kola.

KANDARPA, a name of Kama, the Hindoo god of love. See Kama.

KANDEGHERI, in *Geography*, a town of Hindooſtan, in the Carnatic, formerly the capital of a kingdom, called Narſinga, and the reſidence of a Hindoo king, whoſe dominions extended over Tanjore and Madura. In 1640, a deſcendant of the reigning prince permitted the Engliſh to form a ſettlement at Madras. It is diſtant 70 miles N.W. from Madras. N. lat. 13° 46'. E. long. 79° 24'.

KANDEH-RAO, or Kandoba, in *Hindoo Mythology*, an avatara or incarnation of Siva; his conſort, Parvati, having been alſo incarnated, under the name of Malſara, to accompany her lord in this manifeſtation, which is ſaid by ſome to have occurred in the Carnatic, for the purpoſe of deſtroying a giant named Manimal. A magnificent temple is dedicated to the worſhip of Siva, in this incarnation, at Jejury. It is deſcribed under that article; and by ſome it is ſaid, the incarnation happened there. The incarnated pair are generally repreſented together on horſeback, with a dog, he being four armed. Images and pictures of them are very common in the Mahratta country, where Kandeh-Rao is a popular deity, and is very extenſively propitiated. Several engravings of the ſubject of this article are given in Moor's Hindoo Pantheon.

KANDEK, in *Geography*, a town of Aſiatic Turkey, in the province of Natolia; 48 miles E. of Iſmid.

KANDEL, in *Botany*. See RHIZOPHORA.

KANDERI, in *Geography*, a town of Aſiatic Turkey, in Natolia; 24 miles N.E. of Iſmid.

KANEKING, a town of the Arabian Irak; 23 miles N.N.E. of Shehrban.

KANEM, a city of Africa, in the way from Fezzan to the capital of Bornou. The inhabitants of the adjacent country are compoſed of Muſſulmen and Pagans, and are employed in breeding cattle, and raiſing innumerable horſes for the ſervice of the king; 125 miles N. of Bornou. N. lat. 32°. E. long. 21° 40'.—Alſo, the name given by the geographer Edriſi to the kingdom of *Bornou;* which ſee.

KANG, or *Chineſe Stove*, is a kind of ſtove that is heated by means of a furnace, which caſts all its heat into it. The furnace is adapted to the fire of the ſtove which it is intended to heat; and it may be placed either in a room that is uſed, or an adjoining room, or on the outſide of the houſe. The heat of this furnace, impelled by the outward air, ruſhes through a ſlit into a tube or conductor; and paſſing through this into another pipe or channel at right angles to it, lying under the middle of the floor of the ſtove, ſpreads through the ſtove by vent-holes in this laſt pipe, and is communicated to the bricks which form the pavement of the ſtove, and from them through the whole room. The ſmoke is carried off by funnels at both ends of the ſtoves. See a drawing and deſcription of this kind of ſtove in Phil. Tranſ. vol. lxi. p. i. art. 7.

Any kind of fuel is uſed in the heating furnaces, but ſea-coal is generally uſed: it is obſerved, that in order to draw off the noiſome vapours of the air conſtantly heated by the coal fire, the Chineſe always keep bowls of water in the rooms, and occaſionally renew them; and the emperor's apartments in the palace are decorated with flower-pots, and little orange-trees, &c. which, as the Chineſe philoſophers allege, is the beſt way of ſweetening the air, and abſorbing the fiery particles diſperſed in it.

KANGA, in *Geography*, a ſea-port of Africa, in the kingdom of Loango, ſituated in a ſandy bay of the Atlantic, where veſſels may ride at anchor within muſket-ſhot of the ſhore, in four or five fathoms water.

KANGAANPAA, a town of Sweden, in the government of Abo; 27 miles N.E. of Bjorneborg.

KANGANI, a town of Hindooſtan, in Myſore; 25 miles W. of Tademeri.

KANGASAK, a town of Weſt Greenland. N. lat. 62 . W. long. 48'.

KANGASALA, a town of Sweden, in the province of Tavaſtland; 30 miles N.N.W. of Tavaſthus.

KANGASNIEMS, a town of Sweden, in the province of Tavaſtland; 85 miles N.E. of Tavaſthus.

KANG-CHAN, a town of Corea; 16 miles S.W. of Kang-tcheou.

KANGEE, a town of Africa, in the kingdom of Kaſſon; 33 miles S.E. of Kooniakary.

KANGELANG, an iſland in the Eaſt Indian ſea, about 25 miles from eaſt to weſt, indented on the ſouth coaſt with two or three conſiderable bays. S. lat. 6° 37'. E. long. 115° 44'.

KANGIS, a town of Sweden, in Weſt Bothnia; 80 miles N. of Tornea.

KANG-TCHEOU, a town of Corea, in Kinchan; 170 miles S.E. of Peking. N. lat. 35° 46'. E. long. 128° 49'.

KANG-TCHEOU, a city of China, of the firſt rank, in the province of Kiang-ſi; ſituated on a river of the ſame name. Its river, port, riches, and population, ſerve to attract ſtrangers. Near the walls of the city is a very long bridge, compoſed of 130 boats, joined together by ſtrong iron chains. The cuſtom-houſe is upon this bridge, where a receiver conſtantly reſides, to viſit all barks, and examine if they have paid the neceſſary duties. Two or three moveable boats are ſo placed, that by their means the bridge can be opened or ſhut, to give or ſtop a paſſage; and no barks are ſuffered to paſs that have not been examined. In the territory belonging to this city, a great number of thoſe valuable trees grow, from which varniſh diſtils. Its diſtrict is extenſive, and contains twelve cities of the third claſs. N. lat. 25° 32'. E. long. 114° 30'.

KANG-TCHIN, a town of Corea; 48 miles S.S.W. of Koang-tcheou.

KANGUROO, in *Zoology*, an animal on the coaſt of New Holland, which, when full grown, is as big as a ſheep, and in form reſembling the jerboa. The head, neck, and ſhoulder, are very ſmall in proportion to the other parts of the body; the tail is nearly as long as the body, thick near the rump, and tapering towards the end: the fore-legs of one of them meaſured only eight inches in length, and the hind-legs twenty-two: the progreſs is by ſucceſſive leaps or hops of a great length, in an erect poſture: the fore-legs are kept bent cloſe to the breaſt, and ſeem to be of uſe only for digging. The ſkin is covered with a ſhort fur, of a dark mouſe or grey colour, excepting the head and ears, which bear a ſlight reſemblance to thoſe of a hare. Hawkeſworth's Voyages, &c. vol. iii. p. 174.

KANHAWA, in *Geography*, a large mountainous county of America, on the weſtern line of Virginia, having the Ohio river on the north-weſt, and Kentucky on the weſt. The population conſiſts of 3008 free inhabitants, and 231 ſlaves. About ſeven miles from the mouth of Elk river, in this county, is a burning ſpring, ſufficiently capacious to hold forty gallons. A bituminous vapour conſtantly iſſues from it; and on preſenting a torch within eighteen or twenty inches of its mouth, a column of flame aſcends to the height of three or four feet, and about eighteen inches in diameter, which burns ſometimes for ten minutes, and at other times continues three days.

KANHAWAY, GREAT, a river of Virginia, the head waters of which are in the weſtern part of North Carolina, in the moſt eaſterly ridge of the Alleghany or Apalachian mountains, and ſouth of the thirty-ſixth degree of latitude. Theſe head branches encircle thoſe of the Holſton, from which they are ſeparated by the iron mountain, through which it paſſes ten miles above the lead-mines. About ſixty miles from Little river it receives Green Briar river. About forty miles below the mouth of Green Briar river in Virginia, in the Kanhaway, is a remarkable cataract, the water falling over a rock that traverſes the bed of the river about fifty feet perpendicularly. The obſtacles to the navigation of this river are the Great Falls, ninety miles above its mouth; and from theſe falls to the mouth of Green Briar is a diſtance of 100 miles. Its mouth, where it falls into the Ohio, in the north-weſt part of Virginia, (N. lat. 38° 55′. W. long. 82° 15′) is 280 yards wide.

KANHAWAY, *Little*, a ſmall navigable river of Virginia, 150 yards wide at its mouth in the Ohio, (N. lat. 39° 6′. W. long. 81° 53′) and navigable only ten miles.

KANJA, YANSHA, or *Yanja*, a town of Perſian Armenia, on a ſmall river which runs into the Kur; 150 miles E.N.E. of Erivan.

KANJEE, a town of Hindooſtan, in Berar; 20 miles N. of Notchagong.

KANIKA, a town of Africa, in the kingdom of Bambarra, ſeated on the Niger; 100 miles S.W. of Sego.

KANIOW, a town of Ruſſian Poland, in the palatinate of Kiev, on the Dnieper; 56 miles E. of Bielacerkiew.

KANISS, a town of Africa, in Nubia, on the weſt ſide of the Nile; 25 miles E. of Dongala.

KANITZ, a town of Moravia, in the circle of Brunn; 10 miles S.W. of Brunn. N. lat. 49° 4′. E. long. 16° 21′.

KANKANAN, a town of Hindooſtan, in Lahore; 12 miles S.E. of Lahore.

KANKARU, a town of Africa, in Mandingo. N. lat. 12° 20′. W. long. 5° 45′.

KANKERARA, a town of Hindooſtan, in the circar of Kottah; 32 miles W. of Kottah.

KANKY-LABY, a town of Africa, in the country of Foota. N. lat. 10° 55′. W. long. 16° 5′.

KANNAKA, a town of Hindooſtan, in the country of Kattack, at the mouth of the river Bramnee; 15 miles N.W. of Point Palmiras.

KANNCOONGAN POINT, a cape on the eaſt coaſt of Borneo. N. lat. 1° 3′. E. long. 119°.

KANNEAH, a town of Hindooſtan, in the circar of Sumbul; 15 miles N. of Nidjebabad.

KANNYA, a town of Hindooſtan, in Rohilcund; 35 miles S. of Bereilly.

KANOOERAH, a town of Hindooſtan, in Goondwanah; 75 miles N.N.E. of Nagpour.

KANOON, a town and fortreſs of Hindooſtan, in the country of Mewat; 70 miles S.W. of Delhi. N. lat. 28° 3′. E. long. 76° 30′.

KANOUNG, LITTLE, or KANOUNGLEY, a town of the Birman empire, on the Irrawaddy, in the vicinity of which are plantations of various fruit trees, and fields well fenced and regularly laid down; with every aſpect of induſtry and plenty.

KANOUNG, *Great*, or *Kanoungghe*, a long town, ſituated like the preceding, with a good quay, and well conſtructed wooden ſtairs, conſiſting of 100 ſteps, deſcending to the water's edge. The population in the neighbourhood of this and the forementioned town is conſiderable.

KANOWLY, a town of Hindooſtan, in the country of Viſiapour; 22 miles E.S.E. of Poonah.

KANSA, in *Hindoo Hiſtory*, the uncle of Kriſhna, whom, as his predeſtined deſtroyer, Kanſa made many vain attempts to put to death. After ſeveral fruitleſs efforts, Kanſa ordered all male infants to be ſlain; in a manner that reminds us of the cruelty of Herod on a ſimilar occaſion. See KRISHNA.

KANSAKI, in *Geography*, a town of Japan, in the iſland of Niphon; 28 miles S.W. of Meaco.—Alſo, a town of Japan, in the iſland of Ximo; 15 miles S.W. of Ikna.

KANSEZ, a river of Louiſiana, which runs into the Miſſouri, N. lat. 38° 45′. W. long. 95° 35′.

KANSEZ, *Little*, a river of Louiſiana, which runs into the Miſſouri, N. lat. 38° 17′. W. long. 94° 53′.

KANSEZ, a town of Louiſiana, ſeated on the river Kanſez; 240 miles W. of Genevieve. N. lat. 38° 5′. W. long. 95° 54′.

KANSKOI, a town of Ruſſia, in the government of Kolivan, on the Kan, in which is carried on a conſiderable trade in furs; 140 miles E. of Kraſ-noiarſk.

KANSON, an iſland in the Red ſea, about twenty miles long, and from two to five broad. N. lat. 16° 44′. E. long. 42° 40′.

KANSZILI, a town of European Turkey, in Beſſarabia; 28 miles S. of Bender.

KANT, in *Biography*. See KANTISM.

KANTAMATI, a name of Radha, the wife or miſtreſs of Kriſhna. See RADHA.

KANTERA, EL, in *Geography*, a town of Africa, in the kingdom of Tunis; 14 miles N. of Tunis.

KANTISM, or philoſophy of Emanuel Kant, in the *Hiſtory of Literature*, is the denomination of a ſyſtem of metaphyſical ſcience, invented and propagated with great avidity on the continent, towards the cloſe of the eighteenth century. It is now, even in its birth-place, much neglected; and will probably, in another half century, fall into utter oblivion. The celebrity, however, to which it attained, requires that a pretty full account ſhould be given of it, in a work devoted to the illuſtration of the principles eſpouſed and vindicated by men endowed with ſuperior talents and ardent tempers. We ſhall, accordingly, firſt give a biographical ſketch of the philoſopher, and then endeavour to unravel and develope the ſecrets of his ſyſtem.

Emanuel Kant was born April 22d, 1724, in the ſuburbs of Konigſberg, in Pruſſia. His father, John George Kant, was a ſadler, born at Memel, but originally deſcended from a Scotch family, who ſpelt their name with a C; but the philoſopher, the ſubject of this article, in early life, converted the C into a K, as being more conformable to German orthography. Emanuel, the ſecond of ſix children, was indebted to his father for an example of the ſtricteſt integrity, and the greateſt induſtry; but he had neither time nor talent to be his inſtructor. From his mother, a woman of found ſenſe and ardent piety, he imbibed ſentiments of warm and animated devotion, which left, to the lateſt periods of his life, the ſtrongeſt and moſt reverential impreſſions of her memory on his mind. He received his firſt inſtructions in reading and writing at the charity ſchool in his pariſh; but ſoon gave ſuch indications of ability and inclination to learn, as induced his uncle, a wealthy ſhoe-maker, to defray the expence of his farther education and ſtudies. From ſchool he proceeded to the college of Fridericianum. This was in the year 1740; and his firſt teacher was Martin Kautzen, to whom Kant was ſtrongly attached, and who devoted himſelf with no leſs zeal to the inſtruction of his pupil, and contributed very greatly to the unfolding of his talents. His favourite ſtudy at the univerſity was that of mathematics, and the branches of natural philoſophy connected with them. On the completion of his ſtudies, he accepted a ſituation as tutor in a clergyman's family. In this, and in two other ſimilar ſituations, he was not able to ſatisfy his mind that he did his duty ſo well as he ought: he was, according to his own account, too much occupied with acquiring knowledge to be able to communicate the rudiments of it to others. "I always," ſaid he, "valued the buſineſs of inſtructing of young people; but I could never level myſelf to their infant capacities." Having acted in the capacity of a tutor for nine years, he returned to Konigſberg, and maintained himſelf by private inſtruction, that he might be ready to embrace the firſt opportunity that offered of being introduced to a higher ſphere of action in the univerſity. In 1746, at the age of twenty-two, he began his literary career with a ſmall work, intitled, "Thoughts on the Eſtimation of the Animal Powers, with Strictures on the Proofs advanced by Leibnitz and other Mathematicians on this Point; to which are annexed, various Reflections on the Powers of Bodies in general." In 1754, he publiſhed "An Examination of the Prize-Queſtion of the Berlin Society,—Whether the Earth, in turning round its Axis, by which the Succeſſion of Day and Night was produced, had undergone any Change ſince its Origin? What could be the Cauſes of it; and how we could be aſſured of it?" This work acquired him great reputation as a philoſopher, and paved the way to his long-deſired promotion to a degree in the univerſity. In the year 1755, he was choſen maſter of arts, and entered immediately upon the taſk of lecturing, which he performed to his own ſatisfaction, and the enthuſiaſtic approbation of a very crowded audience. During the ſpace of fifteen years, which he continued in this office, he publiſhed a variety of tracts on the abſtruſe branches of ſcience. Among theſe may be mentioned, 1. "An univerſal Natural Hiſtory and Theory of the Heavens, or an Eſſay on the Conſtitution and mechanical Structure of the whole Globe, according to the Newtonian Syſtem." On this ſubject his biographer ſays, "that the juſtneſs of Kant's theory was, thirty years afterwards, evinced by the practical inveſtigation of Herſchel." 2. "Principiorum primorum Cognitionis Metaphyſicæ nova Dilucidatio." 3. In 1758, he gave the world "New Principles of Motion and Reſt, and the Reſults connected with them in the Fundamentals of Natural Philoſophy." This work excited very much notice, and was afterwards inſerted more at large in his later writings. 4. In 1759, he publiſhed "Conſiderations on Optimiſm." And, 5. In 1763, "The only poſſible Grounds for a Demonſtration of the Deity." In the laſt mentioned work, the author wiſhed to ſhew that without prefuppoſing the independent exiſtence of ourſelves, or that of other ſpirits, ſomething is poſſible; and on that proof alone reſts the grounds by which to demonſtrate the exiſtence of a Deity. This piece contributed very much to eſtabliſh his literary character. The firſt traces of that metaphyſical ſyſtem, which has given ſuch celebrity to the name of Kant, are to be found in his inaugural diſſertation, "De Mundi ſenſibilis atque intelligibilis Forma et Principiis," which was written in the year 1770, when he was appointed to a profeſſorial chair in the univerſity of Konigſberg. He had, previouſly to this, had offers of preferment, which he declined. His reputation and literary character had been long known to the Pruſſian monarch, who had made him repeated offers of a profeſſorſhip in the univerſities of Jena, Erlangen, Mitau, and Halle; and alſo to have inveſted him with the character of privy counſellor. He declined all theſe honours, from an attachment to his native place. He wiſhed to labour and to be uſeful on the ſpot where he had received his phyſical and mental exiſtence; and it was not till March 1770 that the metaphyſical department at Konigſberg became vacant, which was immediately beſtowed upon him. The ſituation required his whole attention to metaphyſical ſubjects, and his ſucceeding publications were almoſt entirely of this nature. He purſued this ſtudy with the moſt unremitting ardour, and entered into all the depths of metaphyſical ſubtlety, in order to unfold the rational powers of man, and deduce from thence his moral duties. It was not till the year 1781, that the full developement of the principles of his ſyſtem appeared in his "Review of pure Reaſon." The German title of this work is "Critik der reinen vernunft;" and the ſyſtem it contains is commonly known under the name of the "Critical Philoſophy." This celebrated work, on which we ſhall ſhortly enlarge, was nearly ſix years publiſhed before its importance was at all underſtood; and it is perhaps one of the moſt ſtriking inſtances of the reverſes of literary fortune, that the bookſeller was about to deſtroy the copies for waſte paper, when a ſudden demand required and exhauſted rapidly three new editions. The doctrine was ſoon preſented, under innumerable forms, by a multitude of commentators; among the earlieſt and moſt diſtinguiſhed of whom were Reihold, the ſon-in-law of Wieland, and the mathematician Schultz. For a conſiderable time the ſyſtem of Kant had, in almoſt every philoſopher of Germany, either an avowed partiſan or determined antagoniſt. In his "Criticiſm of pure Reaſon," he maintained that the doctrine of materialiſm was limited by external objects; and that any pretended perception of things in themſelves, and independent of a ſenſual repreſentation, was utterly impoſſible. This publication, which ſubjected him to much miſrepreſentation, occaſioned a ſecond part in 1783, intitled, "Prolegomena for future Metaphyſics, which are to be conſidered as a Science." In this he illuſtrated his former doctrine, and entirely abſtracted from the definition of metaphyſics any thing ſupernatural. In 1786, he was appointed rector of the univerſity, an office to which he was called a ſecond time in 1788; and in a few months after, he was advanced to be ſenior of the philoſophical faculty. About the year 1798, he took leave of the public as an author, and ſoon after gave up all his official ſituations; and, in conſequence of increaſing infirmities, he retired into an almoſt perfect ſolitude, having been a writer ſixty years, and having written more than ſixty works. During the laſt ten years of his life, his corporeal and mental decay was ſtrikingly and painfully viſible to his friends: but in nothing did the decay of nature diſcover itſelf ſo clearly as in his perfect loſs of memory. An intimate friend, who had been a beloved ſcholar alſo, and who had for many years enjoyed the pleaſure of his ſociety, entered his room a few months before his deceaſe, and with the freedom of a friend, going up to him, embraced him with a ſort of filial reverence. Kant, however, declared that he had not the pleaſure of knowing him. He uſed every means in his power to bring the idea of himſelf freſh in his mind; but it was all in vain: "the ſun of his genius was ſet; the vapour which overſpread the horizon of his ſoul, darkened every object paſt and preſent." He died on the 12th of February 1804. The character of M. Kant called for univerſal reſpect and admiration; and during his life he received from the learned throughout Germany, and from others in diſtant countries, marks of eſteem bordering upon adoration. His principles were made the ſubject of univerſal inveſtigation, and obtained him a multitude of zealous adherents. In the univerſities of Jena, Halle, Gottingen, Erlangen, &c. lectures were delivered on his ſyſtem; and books were written by his advocates, to illuſtrate and defend his doctrines. Profeſſors were even ſent, at the requeſt and expence of princes and crowned heads, to learn more minutely, by a perſonal conference with him, what had not been ſufficiently elucidated in his books. His lectures were conſtantly crowded by young perſons; and, not unfrequently, perſons far advanced in years and knowledge came to ſit, as diſciples, at the feet of the German Gamaliel. Truth was the object of his ſearch, and liberality was the reſult. He wiſhed to eſtabliſh all human knowledge on the firm baſis of reaſon; and rejected all principles as viſionary, which did not admit of a fundamental explication. He conceived, however, of religion as an inherent quality of the ſoul, which panted after ſome higher object than this tranſitory exiſtence. It demanded no proof from without: it flowed of itſelf from within ourſelves. Hence he was accuſed by ſome of myſticiſm, and by others of infidelity: but it ſeems certain from the teſtimony of his beſt friends, and from the whole tenor of his works, that he was a firm believer in the exiſtence of a great Firſt Cauſe, in a future ſtate of rewards and puniſhments, and in Chriſtianity. In his political opinions, he held that all men were originally born free; but, though a citizen of the world, he was, at the ſame time, a friend to peace and good order, and deprecated every violent effort which was made to acquire that freedom to which all men are by nature entitled; and in his own private conduct, he always teſtified due reſpect and ſubmiſſion to eſtabliſhed authorities. By one of his biographers, M. Charles Villers, Kant is repreſented as having never withdrawn, in a life of eighty years, from his native city; contenting himſelf, in the true ſimplicity of a ſage, with the occupations of ſtudy, and the ſociety of a few favoured friends. It is not merely as a metaphyſician that he claims to be conſidered; for there is ſcarcely a ſcience which he has not endeavoured to illuſtrate. He is a mathematician, an aſtronomer, a chemiſt; in natural hiſtory, in phyſics, in phyſiology, in hiſtory, in languages, and literature, and the arts; in all the details of geography, as they relate to the exact ſituation of the parts of the globe, their inhabitants, and productions, every thing is familiar to him. The prominent feature in Kant's intellectual character was the accuracy with which he analyſed the moſt complex ideas. Nothing eſcaped the ſcrutiny of his intellectual eye. Whatever was barely perceivable to others in the moral and phyſical world, became manifeſt to him. He diſcovered, therefore, very eaſily the congruities of other men's ſentiments, and traced with perfect preciſion their errors to their true ſource. He had likewiſe the faculty of unfolding the moſt abſtruſe principles, and digeſting ſingle and individual ſentiments into a ſyſtematic order. Herein conſiſted the originality of his mind. He viewed the world through the medium of his own happy temper, and found every thing around him agreeable and alluring. He is ſaid to have united in the happieſt degree two qualities ſo rarely combined in one perſon, – the greateſt acuteneſs of reaſoning, with the poliſh of a gentleman. He poſſeſſed the enviable talent of making every thing intereſting upon which he ſpoke, and of being able to ſpeak upon every ſubject. Such was profeſſor Kant. We ſhall now touch upon his theory as a metaphyſician.

Beſides employing a vaſt number of words of his own invention, chiefly derived from the Greek language, Kant uſes expreſſions, which have long been familiar to metaphyſicians, in a ſenſe different from that in which they are generally received: and hence a large portion of time is requiſite to enable the moſt ſagacious mind to aſcertain with preciſion the import of his phraſeology. He divides all our knowledge into that which is “a priori,” and that which is “a poſteriori.” Knowledge “a priori” is conferred upon us by our nature; and knowledge “a poſteriori” is derived from our ſenſations, or from experience; and it is, in this ſyſtem, denominated “empyric.” Kant does not, as this diviſion would ſeem to imply, intend to revive the doctrine of innate ideas. He conſiders all knowledge as acquired: he maintains that experience is the productrice of all knowledge, and that without it we could not have had a ſingle idea. Our ideas “a priori,” he ſays, are produced *with* experience, but not *by* it, or do not proceed from it. They exiſt in, and are forms of the mind. They are diſtinguiſhed from other ideas by two marks, which are eaſily diſcerned: they are univerſal and neceſſary; they admit of no exception, and their converſe is impoſſible. Ideas which we derive from experience have no ſuch characters. We can imagine that what we have ſeen, or felt, or heard once, we may ſee, or feel, or hear again; but we do not perceive any impoſſibility in its being otherwiſe. Thus, if I ſee a building on fire, I am certain of this individual fact; but it affords no general knowledge. But if I take twice two ſmall balls, and learn to call twice two four, I ſhall immediately be convinced that any two bodies whatever, when added to any other two bodies, will conſtantly make the ſum of bodies four. Experience affords the opportunity of acquiring this knowledge; but it has not given it: for how could experience prove that this truth ſhould never vary? Experience muſt be limited, and cannot teach what is univerſal and neceſſary. It is not experience which diſcovers to us, that we ſhall always have the ſurface of a whole pyramid, by multiplying its baſe by the third part of its height; or, that two parallel lines extended “in infinitum” ſhall never meet.

All mathematical truths, according to Kant, are “a priori:” thus, that a ſtraight line is the ſhorteſt of all poſſible lines between two given points; that the three angles in any plane triangle are always equal to two right angles, are propoſitions which are true “a priori.” Pure knowledge “a priori,” is that which is without any mixture of experience. Two and two make four, is a truth of which the knowledge is “a priori;” but it is not *pure* knowledge, becauſe the truth is particular. The ideas of ſubſtance, and of cauſe and effect, are “a priori;” and when they are ſeparated from the objects to which they refer, they form, according to this ſyſtem, “void ideas.” It is our knowledge “a priori,” that is, the knowledge which precedes experience, as to its origin, which renders experience poſſible. Our faculty of knowledge has an effect on our ideas of ſenſation, analogous to that of a veſſel which gives its own form to the liquor with which it is filled. Thus, in all knowledge “a poſteriori,” there is ſomething “a priori,” derived from our faculty of knowledge. All the operations of our minds, all the impreſſions which our ſenſes receive and retain, are brought into effect by the conditions, the forms, which exiſt in us by the pure ideas “a priori,” which alone render all our other knowledge certain. Time and ſpace are the two eſſential forms of the mind: the firſt, for impreſſions received by the internal ſenſe; the ſecond, for thoſe received by our external ſenſes. It is by means of the form *ſpace*, that we are enabled, “a priori,” to attribute to external objects impenetrability, diviſibility, &c.; and it is by means of the form *time*, that we attribute to any thing duration, ſucceſſion, &c. Arithmetic is derived from the internal ſenſe, and geometry from that of our external. Our underſtanding collects the ideas received by the impreſſions made on our organs of ſenſe, confers on thoſe ideas unity by a particular energy “a priori,” and thereby forms the repreſentation of each object. Thus a perſon is ſucceſſively ſtruck with the impreſſions of all the parts which form a particular garden. His underſtanding unites theſe impreſſions, or the ideas reſulting from them; and in the unity produced by the act, it acquires the idea of the whole garden. If the objects which produce the impreſſions, afford alſo the matter of the ideas, then the ideas are “empyric;” but if the objects only unfold the forms of the thought, the ideas are “a priori.”

Judgments are divided into two ſpecies; *analytic* and *ſynthetic*. An *analytic* judgment is that in which the attribute is the mere developement of the ſubject, and is found by the ſimple analyſis of the perception,—as, a triangle has three ſides. A *ſynthetical* judgment is that in which the attribute is connected with the ſubject by a cauſe or baſis taken from the faculty of knowledge, which renders this connection neceſſary,—as, iron is heavy; wood is combuſtible; the three angles of a plane triangle are equal to two right angles.

The forms of the underſtanding are, in this ſyſtem, quantity, quality, relation, modality. *Quantity* is diſtinguiſhed into general, particular, and individual; *quality*, into affirmation, negation, infinite; *relation*, into categoric, hypothetic, and disjunctive; and *modality*, into problematic, certain, and neceſſary. M. Kant adds likewiſe to the properties of the four principal forms of the underſtanding a table of categories, or fundamental ideas, "a priori."

Pure reaſon is the faculty of tracing our knowledge "a priori," to ſubject it to principles, to trace it from its neceſſary conditions, till it be entirely without condition, and in complete unity. The great work of Kant is divided into ſeveral parts, under the titles, "Of Æſthetic tranſcendental;" "Of tranſcendental Logic;" "Of the pure Ideas of the Underſtanding;" "Of the tranſcendental Judgment;" "Of the Paralogiſm of pure Reaſon," &c. We cannot, from the nature of our work, diſcuſs all the parts of the ſyſtem; but may obſerve, that the author contends that we know objects only by the manner in which they affect us; and as the impreſſions which they make upon us are only certain apparitions or phenomena, it is impoſſible for us to know what an object is in itſelf. Hence the ſyſtem of Kant has been compared with that of Berkeley, which maintains that ſenſations are only appearances, and that there is no truth, only in our reaſon. But Kant does not go to this length. According to his theory, the underſtanding, when it conſiders the apparitions or phenomena, acknowledges the exiſtence of the objects themſelves, inaſmuch as they ſerve for the baſes of thoſe apparitions; though we know nothing of their reality, and though we can have no certainty but in experience.

Truth, according to our author, conſiſts in the agreement of our notions with the objects, in ſuch a manner as that all men are obliged to form the ſame judgment: belief conſiſts in holding a thing to be true, in conſequence of a perſuaſion which is entirely perſonal, and has not its baſis in an object ſubmitted to experience. There is a belief of doctrine; as, that "there are inhabitants in the planets," which is not the ſame as moral belief; becauſe in moral belief there is ſomething neceſſary. The ordinary mode of teaching the exiſtence of God belongs to the belief of doctrine; and it is the ſame with regard to the immortality of the ſoul: nevertheleſs, the author was a firm believer in the exiſtence of God, and a future ſtate; becauſe, ſaid he, "this perſuaſion renders immoveable my moral principles,—principles which I cannot reject, without rendering myſelf contemptible in my own eyes. I wiſh for happineſs, but I do not wiſh for it without morality; and as it depends on nature, I cannot wiſh it with this condition, except by believing that nature depends on a Being who cauſes this connection between morality and happineſs. This ſuppoſition is founded on the want or neceſſity of my reaſon, and not on my duty. We have, however," ſays Kant, "no certainty in our knowledge of God; becauſe certainty cannot exiſt, except when it is founded on an object of experience. The philoſopher acknowledges that pure reaſon is too weak to prove the exiſtence of a being beyond the reach of our ſenſes. The neceſſity of believing in God is, therefore, only ſubjective, although neceſſary and general for all thoſe beings who conform to their duty. The proofs of natural theology, taken from the order and beauty of the univerſe, are proofs only in appearance. They reſolve themſelves into a bias of our reaſon to ſuppoſe an infinite Intelligence, the author of all that is poſſible; but from this bias it does not follow that there really is ſuch an author. To ſay, that whatever exiſts muſt have a cauſe, is a maxim "a priori;" but it is a maxim applicable only to experience: for we know not how to ſubject to the laws of our perceptions that which is abſolutely independent of them. It is impoſſible to know that God exiſts; but we can comprehend how it is poſſible to act morally on the ſuppoſition of the exiſtence of an intelligent Creator,—an exiſtence which practical reaſon forces theoretical reaſon to adopt. This proof not only perſuades, but even acts on the conviction, in proportion as the motives of our actions are conformable to the law of morality. Religion ought to be the means of virtue, and not its object. Man has not in himſelf the idea of religion, as he has that of virtue. The latter has its principle in the mind: it exiſts in itſelf, and not as the means of happineſs; and it may be taught without the idea of God, for the pure law of morality is "a priori." He who does good by inclination, does not act morally. There are compaſſionate minds, which feel an internal pleaſure in communicating joy around them, and who thus enjoy the ſatisfaction of others; but their actions, however juſt, however good, have no moral merit, and may be compared to other inclinations;—to that of honour, for example, which, while it meets with that which is juſt and uſeful, is worthy of praiſe and encouragement, but not of any high degree of eſteem. According to Kant, we ought not even to do good, either for the pleaſure which we feel in doing it, or in order to be happy, or to render others happy; for any one of theſe motives would be *empiric*, and injure the purity of our morals. We ought to act after the maxims derived "a priori," from the faculty of knowledge, which carry with them the idea of neceſſity, and are independent of all experience; after the maxims which, it is to be wiſhed, could be erected into *general laws* for all beings endowed with reaſon.

Such ſeem to be the leading principles of the philoſophy of Kant. It is not our buſineſs to enter into a critical examination of them; but the reader will find this very ably done in the firſt volume of the Edinburgh Review, ſaid to have been written by Mr., now ſir, James Mackintoſh.

Kant, there is no doubt, was very ſincere in all the opinions which he maintained. He was a moſt decided enemy to falſehood of every kind. He never could endure to hear an untruth even in jeſt; and in his own language, he was ſcrupulous to avoid every thing that could convey a falſe idea of himſelf. Nothing could draw him into a temporary renunciation or qualification of his ſentiments; but wherever a free declaration of his opinions was not found agreeable, he was careful never to appear. He wiſhed, in all his actions, to ſhew himſelf to the world ſimply as he was, unvarniſhed by any falſe art whatever; and he even condemned the attempt to conceal one's merit under a forbidding appearance. He had a high ſenſe of his own dignity, as an individual in the ſcale of exiſtence; and he had no leſs reſpect for every man, as an independent and thinking being, and evinced theſe ſentiments by a reſpectful deportment towards all. For merit under every form, and in every perſon, whether of his own or contrary ſentiments, he teſtified the moſt unequivocal eſteem.

After the death of Mr. Kant, a beautiful medal was executed by M. Abramſon of Berlin, as a memorial of his great talents. On one ſide is a ſtriking likeneſs of the philoſopher, with the inſcription "Immanuel Kant nat. 1724." On the reverſe, the artiſt has attempted to expreſs the ſervices which Kant has rendered to ſpeculative philoſophy, by aſſigning limits to its empire, and to ſhew, at the ſame time, the madneſs of attempting to paſs thoſe limits. This he has repreſented by a Minerva ſeated, and holding an owl in her right hand, which ſhe prevents from flying, with the inſcription, "Altius volantem arcuit." Monthly Magazine, 1805. Edinburgh Review, vol. i. Supp. to Ency. Brit.

KANTO, in *Geography*, a town of Japan, in the iſland of Niphon; 140 miles W. of Meaco.

KANTOR, a country of Africa, on the ſouth ſide of the Gambia, with a capital of the ſame name.

KANTREFF, or KANTREV. See CANTRED.

KANTURK, in *Geography*, a market and poſt-town of the county of Cork, province of Munſter, Ireland, ſituated on the river Dalua; 125 miles S.W. from Dublin, and 4 miles S.E. from Newmarket.

KANWARRAH, a town of Hindooſtan, in the circar of Gurrah; 30 miles S. of Mahur.

KAO, one of the Friendly iſlands, in the South Pacific ocean, called alſo Aghao or Oghao, and Kaybay. S. lat. 19° 12'. E. long. 184° 58'.

KAO-CHAN, a ſmall iſland in the Chineſe ſea, and the moſt weſterly of thoſe called Mi-a-tau; 18 miles N.W. of Teng-tcheou.

KAOLIN, the name of one of the two ſubſtances which are the ingredients of china-ware. The other, which is called *petuntſe*, is eaſily vitrifiable, and this kaolin is ſcarce at all ſo: whence the fire compoſes from a mixture of them both a ſemi-vitrification, which is china-ware. See PORCELAIN.

The kaolin, uſed in the compoſition of porcelain, requires leſs labour than the petuntſe. There are large mines of it in the boſoms of certain mountains, the exterior ſtrata of which conſiſt of a kind of red earth. Theſe mines are very deep, and the kaolin is found in ſmall lumps, that are formed into bricks, after having undergone the ſame proceſs with the *petuntſe*; which ſee. Father d'Entrecolles thinks that the earth called terre de Malte, or St. Paul's earth, has much affinity to the kaolin, although it has not thoſe ſmall ſhining particles which are interſperſed in the latter.

M. Reaumur had an opportunity of examining this ſubſtance, not in its native ſtate, but only in form of ſmall bricks, made out of the paſte of the powder of the native kaolin and water. He found it of a white colour, and ſprinkled all over with fine glittering particles; but theſe he did not judge to be fragments of a different ſubſtance mixed among the maſs, as are the ſmall flakes of talc in our clays and ſands; but that the whole maſs was compoſed of ſome ſtone reduced to powder, and made into a paſte with water, and that theſe larger ſpangles were only coarſer particles of the powder; the examination of which he promiſed himſelf would diſcover what the ſtone was of which they were formed. And this was the more worthy of a diligent inquiry, ſince the petuntſe might eaſily be ſupplied by many of our own earths and ſands; nothing being required of that but a ſubſtance eaſily running into a white glaſs. But the difficulty of vitrifying this other ingredient renders it a thing much more difficult to be ſupplied by one of the ſame nature among ourſelves. The compariſon of theſe, with other mineral ſubſtances, ſoon proved that they were of the nature of talc; or, in other words, that kaolin was talc powdered, and made up into a paſte with water. And to be aſſured whether the whole maſs was talc powdered, or any thing elſe with a mixture of talc, he ſeparated the particles of the kaolin by water, and found the ſmall ones wholly the ſame with the larger; and that the larger, when reduced to powder alone, made with water a paſte wholly the ſame with the kaolin. It is well known, that the fragments of talc have a great reſemblance to the pearly part of ſome ſhell fiſhes: and hence unqueſtionably has ariſen the opinion of porcelain being made of ſea ſhells; ignorant perſons having ſeen the talc of kaolin, and taken it for a ſhelly matter. Talc has not yet been ſucceſsfully uſed in any of our European manufactures of porcelain; but it is eaſy to ſee, from many unanſwerable reaſons, that ſince China porcelain is made of a mixture of vitrifiable and unvitrifiable matter, nothing is ſo likely to ſucceed with us in the place of the laſt of theſe as talc.

1. We know no ſubſtance in the foſſile world ſo difficult to reduce to glaſs as talc, which, if put into the ſtrongeſt of our fires, in a crucible, is not to be vitrified, nor even calcined. 2. We know no ſubſtance which keeps ſo much brightneſs after having paſſed the fire as talc, or that is of ſo pure a white; whence we may alſo learn that it is not to the petuntſe alone, that the china-ware owes its whiteneſs, but that the kaolin is inſtrumental to the giving it that colour. 3. Talc is tranſparent, nay, and in ſome degree keeps its tranſparence after the action of the moſt violent fire. If we are to make porcelain of a vitrifiable and unvitrifiable matter mixed together, yet it is neceſſary that the unvitrifiable one ſhould retain its tranſparence, otherwiſe it would obſcure the maſs; and talc is therefore the only known ſubſtance qualified for this purpoſe. Perſons who have been at the china works, ſay, that the porcelain is made of equal quantities of petuntſe and kaolin, and it is therefore a juſt and exact ſemi-vitrification. 4. Talc is well known to have a great flexibility or toughneſs, and as it is found to preſerve this even after it has paſſed the fire; it is very probable, that it is owing to this property of the kaolin that the china-ware is ſo much leſs brittle than glaſs. Mem. Acad. Par. 1727.

It has been before obſerved, that we may eaſily, in Europe, be provided with different ſubſtances, which will, in our porcelain manufactures, ſupply the place of the petuntſe of China, and talc appears equally qualified to ſerve inſtead of the kaolin. For this purpoſe we may uſe the common Muſcovy talc, or iſinglaſs, uſed by our miniature-painters to cover their pictures inſtead of glaſs, and, by the curious, to preſerve objects for the microſcope; or perhaps the Venetian talc of the druggiſts would ſucceed even better: at leaſt the proceſs is ſo rational, as to be extremely well worth trying.

But this kaolin is more probably an argillaceous earth, from its forming with water a maſs tenacious enough to be made into the loaves into which it is brought over. M. Bomare ſays, that by analyſing ſome Chineſe kaolin, he found it was a compound earth, conſiſting of clay, to which it owed its tenacity; of calcareous earth, which gave it a mealy appearance; of ſparkling particles of mica, and of ſmall gravel or particles of quartz cryſtals. He ſays, that he has found a ſimilar earth upon a ſtratum of granite, and conjectured that it may be decompoſed granite. This conjecture is the more probable, as kaolins are frequently found in the neighbourhood of granites. See CLAY, HOACHI, and PORCELAIN *Earth*.

KAO-TCHEOU, in *Geography*, a city of China, of the firſt rank, in the province of Quang-tong, ſituated in a delightful and fertile country, on a river, about 36 miles from the ſea. The tide ebbs and flows as far as this town, and ſerves for bringing up to it the Chineſe barks. It has in its diſtrict one city of the ſecond claſs, and five cities of the third. On one ſide this diſtrict is ſurrounded by the ſea, and on the other by mountains; and it abounds with peacocks, and ſeveral ſorts of birds of prey. In the vicinity of the town is a kind of ſtone, reſembling marble, and repreſenting, naturally, rivers, mountains, trees, and landſcapes; this ſtone is cut into ſlabs, and formed into tables and other curious pieces of furniture. Crabs are alſo found on the coaſts, ſimilar to thoſe of Europe; but when they are taken out of the water, they become petrified, without any change of their natural figure. The Chineſe phyſicians uſe them as a remedy againſt fevers. N. lat. 21° 40′. E. long. 110° 4′.

KAO-TCHUEN, a town of Corea; 104 miles N.E. of King-ki-tao.

KAPAR, a town of Pruſſia, in the circle of Smaland, 10 miles W. of Konigſberg.

KAPAW, a town of the iſland of Borneo, near the E. coaſt; 100 miles E.S.E. of Nagara.

KAPI, a term in the eaſtern countries for *gate*.

Thus the chief gate of the palace of the emperor of Perſia is called *alla kapi*, the Gate of God. Hence alſo, the officer who has the command of the grand ſeignior's palace gates, is called *capighi bachi*.

KAPILA, in *Biography*, a very eminent literary character among the Hindoos, and founder of one of their philoſophical ſchools, having many tenets in common with the theories introduced to Europe by Pythagoras, eſpecially that of the unlawfulneſs of ſlaying animals to eat, under pretence of a ſacrifice; as ſeemed to have been very extenſively practiſed in India. This benevolent doctrine became ſo approved, that the grateful Hindoos have deified Kapila; affirming that he was an incarnation of the god Viſhnu, under the name of Vaſudeva, as Kapila is called in their ſacred romances, the Púranas. His theory is named Sankya, which ſeems a modification of that called Mimanſa, which correſponds with the Platonic. Theſe points are ſlightly touched on in Moor's Hindoo Pantheon, and the ſame writer, in a poſterior work, (Hindoo Infanticide,) ſays that "Kapila expounded to the Hindoos the ſame tenet (the immortality of things) modified, to give it the attraction of variety and novelty. He, as Epicurus did after him, tricked out his theory in ſo meretricious a ſtile, as to have provoked, from more ſober reaſoners, the opprebrium of atheiſm." See Mimansa and Sankya.

KAPLANIK, in *Geography*, a town of European Turkey, in Macedonia; 60 miles N.E. of Akrida.

KAPLITZ, a town of Bohemia, in the circle of Bechin; 9 miles S.E. of Crumau.

KAPOS, a town of Hungary.—Alſo, a river which runs into the Danube, ſix miles from Mohacs.

KAPOSVAR, a town and caſtle of Hungary, formerly very ſtrong, but now much reduced; 12 miles W. of Altenburg. N. lat. 46° 30′. E. long. 17° 51′.

KAPPAS, a tribe of Illinois Indians, in Louiſiana, formerly very numerous. Their country has good paſturage.—Alſo, a town of Louiſiana, on the Miſſiſſippi; 130 miles S.S.W. of New Madrid. N. lat. 34° 36′. W. long. 91°.

Kappas *Old Fort*, ſituated in Louiſiana, at the mouth of the river St. Francis, and built by the French, principally for a magazine of ſtores and proviſions during their wars with the Chickaſaws, by whom their Illinois convoys were attacked and deſtroyed.

KAPRIAN, a town of European Turkey, in Moldavia; 60 miles E. of Jaſſi.

KAPSBERGER, Johannes Hieronimus, in *Biography*, a German of noble birth, celebrated by Kircher (Muſurgia), and by many others, was not more famed for the number and variety of his compoſitions, than for his exquiſite ſkill in performing upon almoſt every ſpecies of inſtrument; but more particularly on the theorbo lute, which ſeems to have been a new invention in the 17th century. The author's name has not been recorded; but it is ſaid to have been of Neapolitan conſtruction. The difference between the common lute and theorbo, was in the latter having two necks, and thence called in Latin *Cithara bijuga*.

Kapſberger, who aſſiſted Kircher in compiling many parts of his Muſurgia, is highly praiſed by that laborious, but often credulous and viſionary author; but, according to Bapt. Doni, Kapſberger was loquacious and preſumptuous. The truth is, that the practical muſician and the dilettante theoriſt were rivals in the favour of cardinal Barberini, afterwards Urban VIII., a lover and patron of muſic. Both the diſputants were reformers, but with different views: Doni, a credulous believer in the miraculous powers of the muſic of the ancients, without underſtanding the modern; and Kapſberger, an innovator, who wiſhed to have the compoſitions of Paleſtrina baniſhed the church, in order to make way for his own. The feuds of muſicians and their partizans are ſeldom worth recording; as it often happens that they are unable to explain to the public the cauſe of their difference.

KAPSDORF, in *Geography*, a town of Hungary; 26 miles N.N.W. of Caſſovia.

KAPTERO, an iſland in the gulf of Bothnia, near the E. coaſt, about eight miles long and two broad; 2 miles W. of Waſa.

KAPTSCHAK, a large and well-compacted ſtate, which Banty, the kinſman of the great Tchingis or Zingiſkhan, founded, about the year 1240, fell, in the year 1441, into four khanates, *viz.* Kazan, Aſtrachan, Kaptſchak, and the Krim. The firſt of theſe were, ſomewhat more than 100 years afterwards, conquered by the Ruſſians; but the fourth of theſe ſtates preſerved its independency above 230 years longer. At preſent, however, they altogether form a part of the Ruſſian empire. The khanate of Kaptſchak, which, from the time of its ſeparation in 1441, has had its principal ſeat in the plain, which is now called the Aſtrachan-ſteppe, fell firſt. So long ago as the year 1506, it loſt its laſt khan, and was divided among the ſovereigns of Kazan, Aſtrachan, and the Krim, on which at length it came to Ruſſia by the conqueſt of the two former ſtates. Theſe repeated ſubjugations had reduced the Kaptſchak Tartars to an inſignificant reſidue, which, now removed from its ancient homeſtead, dwells among Baſchkirs and Kirghiſes, though ſtill retaining its appellation, and the memory of its origin. Tooke.

KAR, a town of Perſia, in the province of Irak; 156 miles N. of Iſpahan.

KARA, a river of Ruſſia, which runs into the Karſkoi ſea, at Karſkoi.—Alſo, a town of Hindooſtan, in Guzerat; 60 miles S.W. of Gogo.—Alſo, a town of Hindooſtan, in Berar; 8 miles N. of Chanda.

KARA-AGATZ, a town of European Turkey, in Romania; 6 miles S. of Adrianople.

KARA-BAGAN, a town of Aſiatic Turkey, in Natolia; 24 miles S. of Milets.

KARABAGH, or the *Black Garden*, a mountainous province of the principality of Georgia, ſouth of the river Aras.

KARABAS, a mountain of Grand Bucharia; 50 miles N. [illegible] of Samarcand.—Alſo, a town of Perſia, in the province of Irak; 70 miles S.S.W. of Hamadan.

KARABASAR, a town of Ruſſia, in the government of Tauris; 35 miles N.E. of Bagtſeray.

KARABAZARI, a town of Aſiatic Turkey, in Natolia; 20 miles W. of Kiangari.

KARABE. See CARABE.

KARABEI-SHEH, in *Geography*, a town of Perſia, in the province of Mazanderan, on the coaſt of the Caſpian ſea; 60 miles E. of Fehrabad.

KARA-BIGNAR, a town of Aſiatic Turkey, in Caramania; 20 miles S. of Akſerai.

KARABIOW, a town of Poland, in Podolia; 12 miles N. of Kaminiec.

KARABOA, a town of Aſiatic Turkey, in Natolia; 24 miles W. of Artaki.

KARABOGAS, a bay on the E. ſide of the Caſpian ſea, 40 miles long and 25 broad, the water of which is very bitter. N. lat. 41° 45′. E. long. 54° 44′.

KARABOULAKI, a town of Georgia, in the province of Carduel: 45 miles S. of Gori.

KARABUNAR, a town of Aſiatic Turkey, in Caramania; 40 miles E. of Cogni.

KARAC, a town of Arabia Petræa, on the river Saſia; 90 miles S. of Jeruſalem. N. lat. 30° 44′. E. long. 35° 45′.

KARACAL, or CARACALLA, a town of Walachia; 60 miles S.W. of Buchareſt.

KARACUZ, a town of Perſian Armenia; 22 miles E.S.E. of Erivan.

KARADERA, a town of Aſiatic Turkey, in Diarbekir; 10 miles S.S.E. of Merdin.

KARADJEHLAR, a town of Aſiatic Turkey, in Natolia; 36 miles S.W. of Caſtamena.

KARADJUK, a town of Natolia; 20 miles S.E. of Degnizlu.

KARADRO, a town of Aſiatic Turkey, in Caramania; 50 miles W.S.W. of Selefké.

KARADSHELAR, a town of Natolia; 40 miles N. of Angura.

KARAEVIAN, a town of Ruſſia, in the government of Perm; 64 miles S.S.W. of Ekaterinograd.

KARAGANSKOI, CAPE, a cape on the E. coaſt of the Caſpian ſea. N. lat. 44° 20′.

KARAGINSKOI, an iſland in the N. Pacific ocean, near the N.E. coaſt of Kamtſchatka, about 80 miles in circumference. N. lat. 59°. E. long. 162° 14′.

KARAGODE, a town of the iſland of Ceylon; 86 miles S. of Candy.

KARAGOL, a town of Grand Bucharia, ſeated on a lake; 24 miles S.W. of Bucharia.

KARAH, a town of Arabia, in the province of Nedsjed; 300 miles E. of Mecca.

KARAHAUM, a town of Bengal; 13 miles N.W. of Toree.

KARAHISSAR, a town of Aſiatic Turkey, in Caramania; 38 miles S. of Yurcup. See APHIOM, &c.

KARA-HOTUN, a town of Tartary, in the country of the Monguls; 120 miles N.W. of Peking. N. lat. 41° 16′. E. long. 121 53′.

KARAJIN, a town of Poland, in the palatinate of Braclaw, near the Bog; 50 miles S.E. of Braclaw.

KARAIS, a town of Sweden, in the province of Savolax; 35 miles N.N.W. of Nyſlot.

KARAITES. See CARAITES.

KARAKAJI, in *Geography*, a town of Georgia, in the province of Kaket; 80 miles S.E. of Teflis.

KARAKAKOOA BAY, a bay on the W. ſide of the iſland of Owhyhee, one of the Sandwich iſlands, ſituated in a diſtrict called Akona. It is about a mile in depth, and bounded by two low points of land, at the diſtance of half a league, and bearing S.S.E. and N.N.W. from each other. On the N. point, which is flat and barren, ſtands the village of Kowrowa; and in the bottom of the bay, near a grove of tall cocoa-nut trees, there is another village of a more conſiderable ſize, called Kakooa; between them runs a high rocky cliff, inacceſſible from the ſea-ſhore. On the S. ſide, the coaſt, for about a mile inland, has a rugged appearance; beyond which the country riſes with a gradual aſcent, and is overſpread with cultivated incloſures, and groves of cocoa-nut-trees, where the habitations of the natives are ſcattered in great numbers. The ſhore, all round the bay, is covered with a black coral rock, which makes the landing very dangerous in rough weather, except at the village of Kakooa, where is a fine ſandy beach, with a "morai," or burying-place, at one extremity, and a ſmall well of freſh water at the other. This bay, appearing to Capt. Cook a proper place to refit the ſhips, and lay in a freſh ſupply of water and proviſions, he cauſed them to move on the N. ſide, about ¼ of a mile from the ſhore, Kowrowa bearing N.W. This was in January 1779. The natives came from the ſhore in aſtoniſhing numbers, and expreſſed their joy by ſinging and ſhouting, and exhibiting a variety of wild and extravagant geſtures. Capt. Cook was received by the chiefs of the iſland with a reſpect, approaching to adoration; and the natives, though they manifeſted a propenſity to pilfering, treated him and his companions with a great degree of hoſpitality. On the 4th of February, the ſhips unmoored and failed out of the bay, being followed on their departure by a great number of canoes. It was the deſign of Capt. Cook to finiſh the ſurvey of this iſland before he viſited the other iſlands, in hopes of finding a road better ſheltered than the bay which was now left. But the weather becoming ſqually and tempeſtuous, it was found neceſſary to return to this bay; where the natives manifeſted a very different diſpoſition from that which they had diſcovered on the firſt viſit. They now appeared hoſtile, and adverſe to every exerciſe of hoſpitality. Several circumſtances occurred, which ſerved to widen the breach between the iſlanders and Capt. Cook; and it was found neceſſary to recur to the uſe of arms. For ſubſequent particulars, and an account of the unfortunate death of the commander, ſee his biographical article.

KARAKALPAKS, a tribe of Tartars ſettled in Ruſſia, who called themſelves Kara-Kiptſchaks, and inhabit the diſtricts on the Syr Darya, a conſiderable river ſpringing from the lake Aral. They divide themſelves, according to their poſition, into the upper and the nether horde. Previous to the origin of the Kazanian khanate (ſee KAZAN), they removed to the Volga; where, preſſed by the Nogays, they marched like the Chivinſes, not as other nations did to the weſt, but back towards the eaſt, into their preſent ſeats. About the year 1742 the nether horde, then conſiſting of 30,000 kibitkas, implored the Ruſſian protection; but the Kirghiſes, againſt whom they were deſirous of ſecuring themſelves, took ſuch ſanguinary vengeance, that the greater part of them was exterminated, and thoſe who remained were obliged to return to the upper horde. As they ſeldom have the courage to flee from the Kirghiſian captivity, their number in Ruſſia is very ſmall. Tooke's Ruſſ. Emp. vol. i.

KARAKAN, a town of Curdiſtan; 10 miles S.W. of Betlis.

KARAKECHIS, a town of Perſian Armenia; 48 miles N.E. of Erivan.

KARAKERMAN, a town of European Turkey, in Bulgaria; 36 miles S.S.E. of Iſmail. N. lat. 44° 45′. E. long. 29° 58′.

KARAKITA, a ſmall iſland in the Eaſt Indian ſea, belonging to the king of Ternate. N. lat. 3° 6′. E. long. 125 24′.

KARAKUM, or the *Black Sand*, the name of a great deſert, which forms the northern boundary of Khoraſan and modern Perſia.

KARAKURODY, a town of Perſia, in the province of Schirvan; 20 miles S. of Scamachie.

KARALANSKA, a town of Ruſſia, in the government of Irkutſk, on the Tunguſka; 72 miles N.W. of Ilimſk.

KARALEIJANGO, a town of Africa, in Kaarta. N. lat. 14° 20′. W. long. 6° 20′.

KARALUKALA, a town of Turkiſh Armenia, in the government of Erzerum; 30 miles E. of Erzerum.

KARAMAN, a town of European Turkey, in Bulgaria; 35 miles E.S.E. of Nicopoli.

KARAMEISCHEVO, a town of Ruſſia, in the government of Tver; 72 miles N. of Tver.

KARAMIT, a town of Natolia; 30 miles E.S.E. of Macri.

KARAMUSAH, a town of Natolia, on a bay of the ſea of Marmora; 36 miles N.N.E. of Burſa.

KARAN, a town of Africa, in Benin, in which is a manufacture of fine cloth.

KARANKALLA, a town of Africa, in Kaarta; 10 miles W. of Kemmoo.

KARANSEBES, a town of Hungary, on the Temis; 38 miles E.S.E. of Temiſwar.

KARASBAG, a town of Perſian Armenia; 174 miles E.S.E. of Erivan.

KARASM, or CHARASM, a country of Aſia, bounded on the N. by Turkeſtan, on the E. by Grand Bucharia, on the S. by Khoraſan, and on the W. by the Caſpian ſea; about 320 miles from N. to S. and about as much from E. to W. The country is in general fertile, and is divided among ſeveral Tartarian princes, one of whom takes the title of khan, aſſuming pre-eminence over the reſt. The capital is Urkonje, which is the uſual reſidence of the khan in winter; but in ſummer he uſually encamps on the ſides of the river Amol; his camp being called Khiva. He is ſaid to be able to raiſe forty or fifty thouſand horſemen. This country was formerly full of cities, towns, and caſtles, ſtrong and populous: it was then a province of the Perſian and Arabian empires; but it was probably moſt flouriſhing, when it ſubſiſted as an independent kingdom, under the family of the Kharaſm khans, who by conqueſt annexed to it the whole of Iran, or Perſia at large, and Turan, or the countries N. of the Gihon or Amu, thus forming a great empire, of which Urkonje was the capital. At preſent its cities are few, and much reduced by the deſolating power of the Uſbecks, who have introduced poverty and diſtreſs wherever they have ſettled.

KARASU, a town of Aſiatic Turkey, in Caramania; 100 miles S.E. of Yurcup.—Alſo, a river of Perſia, called *Karanſu*, which riſes in the N.W. part of the province of Irak, and runs into the Tigris, near Baſſorah, anciently called *Eulæus* and *Choaſpes*.—Alſo, a river of Aſiatic Turkey, called *Koremoz*, which riſes near Kaiſarieh in Caramania, and runs into the Euphrates near Ilija.

KARAT, a town of Arabia, in the province of Oman; 190 miles S.W. of Maſcat.

KARAT. See CARAT.

KARATA, by ſome called *caraguata maca*, a kind of aloe growing in America; whoſe leaves, when boiled, are made into a thread, of good uſe for making cloth, fiſhing nets, &c. Its roots or leaves, thrown into the water, ſtupify the fiſhes to that degree, that they are eaſily taken with the hand; its ſtalk, when dried aud burnt, ſerves for tinder; and when briſkly rubbed on a harder wood, it takes fire, and conſumes itſelf.

KARATAS, in *Botany*, Plum. Gen. 10. t. 33, the Weſt Indian name of a fine plant referred by Linnæus to *Bromelia*; ſee that article, ſp. 2.

KARATCHIN, in *Geography*, a Ruſſian oſtrog, in the peninſula of Kamtſchatka; fifty miles from Bolcheretſkoi. It is pleaſantly ſituated by the ſide of the river Awatſka, and conſiſts of three log-houſes, three jourts, or houſes made under ground, and nineteen balagans, or ſummer habitations. The inhabitants are a ſingularly hoſpitable people.

KARATOPE, a town of Hami, in Chineſe Tartary; 30 miles W. of Hami.

KARAT-SIRIM, a town of Curdiſtan; 40 miles S.E. of Kerkuk.

KARATUIN, a town of Perſia, in the province of Irak; 40 miles N.E. of Nehavend.

KARAULNOI, a town of Ruſſia, in the government of Kolivan, on the Geniſei; 60 miles S. of Kraſnoiarſk.

KARAVUN, a town of Hindooſtan, in Dooab; 40 miles W. of Pattiary.

KARBENING, a town of Sweden, in Weſtmannland; 30 miles N. of Stroemſholm.

KARBY, a town of Sweden, in Weſt Bothnia; 20 miles N. of Lulea.

KARCARA, a town of Perſia, in Segeſtan; 70 miles N.W. of Zareng.

KARCOJA, a town of Perſia, in Segeſtan; 21 miles N.W. of Zareng.

KARCZOW, a town of the duchy of Warſaw; 16 miles S.W. of Czerſk.

KARDAMA, in *Hindoo Mythology*, a being ſometimes ſaid to have been an *avatara* or incarnation of the god Siva, and to have been produced by Brahma's ſhadow; ſometimes he is ſaid to be one of the Riſhis. See RISHI.

KARDANAH, in *Geography*. See BELUS.

KARDGHA, the name of a ſhort ſword held in the hand of Hindoo deities of avenging character; the ſacrifical weapon.

KARDUH, in *Geography*, a town of Perſia, in the province of Kerman; 56 miles N. of Maſtih.

KAREDJUK, a town of Aſiatic Turkey, in Natolia; 20 miles S.S.W. of Degnizla.

KAREK, a town of Perſia, in Segeſtan; 30 miles S. of Fuſheng.

KAREK, a town of Perſia, in the province of Lariſtan; 42 miles S. of Lar.

KAREK, or GARAK, an iſland ſituated on the E. coaſt of the Perſian gulf, between Abu Scheehr and Bender Rigk, containing only a ſingle village; but appearing, from its aqueducts cut in the rocks, to have been formerly more populous in proportion to its extent, which is about five leagues in circumference. The Dutch, who once had a ſettlement here, made the iſland famous, by carrying on a great trade from hence to Baſſora, under the direction of baron Kniphauſen. But Mir Mahenna, prince of Bender Rigk, having made an unſucceſsful attempt upon the iſland, at length concluded a peace with the Dutch governor, who was the ſecond in ſucceſſion to Kniphauſen, and the Dutch trade for ſome time met with no interruption. At a ſubſequent period Mir Mahenna made a deſcent upon Karek, and beſieged the town. The Arab, having outwitted Van Houting, the Dutch governor, entered the fort with a ſmall retinue, in order to ſettle terms of accommodation; and having made the Dutch garriſon priſoners, ſent them to Batavia.

via. This event happened in the end of December 1765. Veſſels ſailing to Baſſorah generally touch at this iſland for a pilot. N. lat. 29° 15′. E. long. 50° 26′.

KAREMPI, Cape, *Karempibaran*, or *Cape Piſello*, a cape on the coaſt of Natolia, in the Black ſea. N. lat. 42° 20′. E. long. 33° 10′.

KARENDAR, a town of Perſia, in the province of Khoraſan; 210 miles N. of Herat.

KAREPOS, a town of Ruſſia, in the government of Archangel; 60 miles N.E. of Archangel.

KAREVON, a town of Perſia, in Farſiſtan; 35 miles N.E. of Paſa.

KAREZIN, a town of Perſia, in Farſiſtan; 60 miles S.E. of Bender Rigk.

KARFE, a kind of cinnamon.

KARGALDZIN, in *Geography*, a lake of Ruſſian Tartary, 60 miles in circuit; 340 miles S. of Orenburg.

KARGAPOL, a town of Ruſſia, on the N. ſide of the lake Latcha. N. lat. 61° 30′. E. long. 38° 50′.

KARGHERD, a town of Perſia, in the province of Khoraſan; 16 miles N.W. of Fuſheng.

KARGHERON, a town of Perſia, in the province of Ghilan; 60 miles N.N.W. of Reſhd.

KARGHI, a town of Aſiatic Turkey, in Natolia; 27 miles N.E. of Kiangari.

KARGINIGI, a town of Ruſſia, in the government of Olonetz; 32 miles W. of Vitegra.

KARGO, a province of Africa, in the kingdom of Loango, famous for its mines of excellent copper.

KARIADEH, a town of Natolia, in the gulf of Smyrna; 18 miles W. of Smyrna.

KARJALA, a town of Sweden, in the government of Abo; 23 miles N. of Abo.

KARIATAIN, a town of Arabia, in the province of Nedsjed, anciently Kirjathjearim; 300 miles E. of Medina.

KARIATEIN, a town of the deſert of Syria; 60 miles S. W. of Palmyra.

KARIBAZARI, a town of Natolia; 18 miles W. of Kiangari.

KARIKAL, or Carical, a town of Hindooſtan, on the coaſt of the kingdom of Tanjore, ſituated on one of the branches of the Cauvery; ceded by the king of Tanjore to the French. It contains five moſques, 14 pagodas, and about 500 inhabitants. It was taken by the Engliſh in 1760, and retaken in 1779; ſix miles S. of Tranquebar.

KARINAIS, a town of Sweden, in the government of Abo; 20 miles N.E. of Abo.

KARINKULA, a town of Africa, in Bambouk. N. lat. 13° 36′. W. long. 9° 50′.

KARIS, a town of Sweden, in the province of Nyland; 10 miles N.N.E. of Eknas.

KARISTOJO, a town of Sweden, in Nyland; 16 miles N.N.E. of Eknas.

KARK, a town of the Arabian Irak, on the Tigris; 80 miles N.N.W. of Bagdad.

KARKA, a town of Aſiatic Turkey, in the government of Sivas; 30 miles S. of Tocat.

KARKARLANG, a ſmall iſland in the Pacific ocean, belonging to a cluſter called Meanges. N. lat. 4° 45′. E. long. 126° 59′.

KARKI, an iſland in the Mediterranean; ſix miles W. of Rhodes. N. lat. 37° 25′. E. long. 27° 19′.

KARKOLA, a town of Sweden, in Tavaſtland; 27 miles E. of Tavaſthus.

KARKRONY, a building where the royal manufactures of Perſia are carried on. Here are made their tapeſtries, cloth of gold, ſilk, wool, and brocades, velvets, taffeties, coats of mail, ſabres, bows, arrows, and other arms. There are alſo in it painters in miniature, goldſmiths, lapidaries, &c.

KARKU, in *Geography*, a town of Sweden, in North Finland; 35 miles S.E. of Biorneberg.

KARLANDA, a town of Sweden, in Warmeland; 42 miles W.N.W. of Carlſtadt.

KARLE, a Saxon word, uſed in our laws, ſometimes ſimply for a *man*, and ſometimes for a *ſervant* or *clown*.

Hence the Saxons call a ſeaman a *buſcarle*, and a domeſtic ſervant a *huſcarle*.

Karle *Hemp*, a term uſed by our country people for the latter green hemp.

KARLEBY, Gamla, in *Geography*, a ſeaport town of Sweden, in Eaſt Bothnia, with a good harbour. It trades principally in hemp, ſalt, and ſhip building; 60 miles S.W. of Cajana. N. lat. 63° 50′. E. long. 23° 1′.

Karleby, *Ny*, a town of Sweden, in Eaſt Bothnia, ſeated on the river Lappojock, about five miles from the ſea, built in 1620 by Guſtavus Adolphus; 70 miles S.W. of Cajana. N. lat. 63° 32′. E. long. 22° 26′.

KARLUTZKA, a town of Ruſſia, in the government of Irkutſk; eight miles E. of Niznei Udinſk.

KARLY, a village ſituated on the road between Bombay and Poona, having in its vicinity a lofty hill, in which are ſome excavations that have not, until within theſe few years, come under the notice of Europeans. The hill is named Ekvera, and is two or three miles to the N.E. of Karly, but the excavations are generally called by the name of the village. The late Mr. Wales, a very reſpectable artiſt, was the firſt European who explored this magnificent cavern-temple, of which he made ſeveral accurate ſketches, and copied ſeveral inſcriptions. The ſketches have not been publiſhed, nor have, we believe, the inſcriptions been hitherto explained. Lord Valentia has more recently viſited Karly, and in his "Travels" deſcribes the cave, of which a beautiful view and a ground plan are given; and Mr. Salt, who accompanied his lordſhip, has, in his elegant ſeries of oriental views, given two of this beautiful temple. Major Moor, who has alſo frequently viſited it, has given a plate of ſome of its ſculptures in his Hindoo Pantheon. There are many apartments ſcooped out of the rock in an elevated ſituation, having flat tops, as uſual in moſt of the Indian excavations; but the grand apartment of Ekvera is arched, and of a moſt ſtriking and magnificent deſcription. "Its ſize, and the peculiarity of its form," ſays lord Valentia, "ſtruck me with the greateſt aſtoniſhment. It conſiſts of a veſtibule of an oblong ſquare ſhape, divided from the temple itſelf, which is arched and ſupported by pillars. The length of the whole is one hundred and twenty-ſix feet, the breadth forty-ſix feet. No figures of any deities are to be found within the pagoda, but the walls of the veſtibule are covered with carvings, in alto-relievo, of elephants, of human figures of both ſexes, and of Budha, who is repreſented in ſome places as ſitting croſs-legged, in others he is erect, and in all attended by figures in the act of adoration; and in one place, two figures ſtanding on the lotus are fanning him, while others hold a rich crown over his head. I think, therefore, that it is beyond diſpute, that the whole was dedicated to Budha." Travels, vol. ii. p. 163. (See Boodh.) The farther end of the cave is round, the ſides ſtraight; a row of pillars, ten feet from the ſides, ſupport kneeling elephants, on which are ſeated human figures, all beautifully ſculptured. From a cornice, running the whole length of the temple over the heads of the figures, ſpring ribs of wood forming an arch, and touching in its whole concavity the roof which they ſeem to ſupport. This is a ſingularity not known to exiſt elſewhere. The wooden ribs are not more than three feet apart, and about two in depth, and nine inches thick, and have ſomething the appearance of a ſhip's bottom, inverted. They run parallel to each other, forming a fine arch, from ſide to ſide of the apartment. The pillars are ſixteen in number on each ſide, with a ſpace between equal to the diameter of their ball, *viz.* about four feet. The pedeſtals are ſquare, the ſhafts polygonal. Seven plainer columns continue the line at the end: on them reſts an architrave, whence an arch ſprings inwards, forming a roof over the altar, as it may be called, which in the Hindoo Pantheon is ſaid to "conſiſt of a vaſt hemiſphere of ſtone, reſting on a round pedeſtal of greater diameter, and having its convexity ſurmounted by a ſort of canopy or umbrella of peculiar conſtruction. The principal arched temple of Kenera is exactly on the ſame plan of that here deſcribed, and the altar is alike in both. That at Elora, deſcribed by ſir Charles Malet, in vol. vi. of the Aſiatic Reſearches, is alſo exactly ſimilar in reſpect to ground plan, but the principal object is different, being Budha himſelf, with the ſemi-globe on the round pedeſtal behind him. In neither of theſe three arched caves will, I think, be found any ſculptures referring to the gods of the Brahmans; and theſe three are the only caves that I ever ſaw or heard of conſtructed with an arched roof. And I preſume to hazard an opinion that they are of modern origin, relatively with other excavations at Ellora and on Elephanta, containing, with and without Budha, many of the deities now worſhipped by the Brahmans.

"What I would hence infer is, that in the older ſculptures we find Budha mixed with the other Hindoo gods: Elephanta and the flat-roofed Pantheiſtic temples at Ellora, I reckon among the oldeſt. In ſculptures more modern, Budha, as a deity, is often ſeen excluſively pourtrayed; the arched caves of Ellora, Karly, and Kenera, I judge to be of later date; and as to form and proportion, of more refined and elegant conſtruction. May we not be allowed, from theſe premiſes, to deduce a farther confirmation of the idea that the Budha incarnation of Viſhnu, and the ſectarial deity of that name, excluſively worſhipped by ſo many different nations under ſo many different forms and deſignations, are one and the ſame perſon? and that ſuch excluſive worſhip, and its accompanying ceremonies and privations, is a hereſy or reformation, or whatever it may be termed, of the more ancient Brahminical religion? Among European as well as Indian enquirers, this opinion will find the moſt numerous, but, like other majorities, not the moſt zealous ſupporters.

"Sir Charles Malet's plate of Ellora gives exactly a repreſentation of the temples of Karly and Kenerah as far as regard ground-plan and general deſign; and they muſt certainly have originated in the ſame perſon, as one has been taken from the other. The capitals of the interior pillars, from which the arched roofs ſpring, are different: at Ellora they appear to be men in the act of adoration; at Karly the entablatures are elegantly formed of figures of men and women ſeated on kneeling elephants, whoſe proboſci, joining at the angles, form, in graceful curves, the volutes of the capitals." P. 245.

In Mr. Daniel's publications of oriental ſcenery, unrivalled in elegance by any production of the Britiſh preſs, are a ſeries of views of Ellora, finiſhed from the ſketches of Mr. Wales. To theſe we refer ſuch as deſire a faithful picture of theſe truly wonderful excavations, of which ſome account occurs in an earlier volume, under the article ELLORA. See alſo ELEPHANTA, (in which article we will here notice an error in the ancient and native name of this curious and intereſting iſland, which is Ghari-puri, or Gari-pouri, and not, as miſprinted, Gari-pouli,) and KENERA for ſome farther particulars of the cavern-temples of India.

KARM, an iſland in the North ſea, about 12 miles long, and two wide, near the coaſt of Norway. N. lat. 59° 17′. E. long. 5° 32′.

KARMALA, in *Hindoo Mythology*, a ſervant or miniſter of Yama, the judge of departed ſpirits. See YAMA.

KARMELIS, in *Geography*, a town of Curdiſtan; 12 miles E. of Moſul.

KARMATIANS, an Eaſtern ſect which bore an inveterate malice againſt the Mahometans, and began to raiſe diſturbances in the year of the Hegira 278. It is ſaid to have originated with a poor perſon, called Karmata, who came from Chuſiſtan, in Perſia, to the villages near Cufa, and there feigned great ſtrictneſs and ſanctity; alleging that God had enjoined him to pray fifty times a day, and pretending to invite people to the obedience of a certain Imam of the family of Mahomet. This courſe he purſued till he had formed a great party, out of which he choſe twelve as his apoſtles, to govern the reſt, and to propagate his doctrines. But as his doctrines promoted idleneſs, particularly among the huſbandmen and peaſants, he was ſeized by the governor of the province, impriſoned, and menaced with death. But this menace having been overheard by a girl, who was one of the governor's domeſtics, ſhe took the key of the dungeon from under her maſter's pillow whilſt he was aſleep, releaſed the priſoner, and returned the key to the place where ſhe had found it. On the following morning, when the fact was known, his adherents announced that God had taken him into heaven. He afterwards appeared in another province, declaring to his followers, that it was not in the power of any one to hurt him: at length, however, his reſolution failed him, and he retired into Syria, and was not heard of any more. His ſect continued, and it was pretended that he was a true prophet, and that he had left them a new law, which changed the ceremonies and form of prayer uſed by the Moſlems, having introduced a new faſt, having allowed them to drink wine, and having diſpenſed with the obligation of ſeveral precepts of the Koran. The precepts of this ſacred book they interpreted allegorically. From the year above-mentioned, the Karmatians, under ſeveral leaders, gave almoſt continual diſturbance to the Caliphs and their Mahometan ſubjects for ſeveral years, committing great outrages in Chaldea, Arabia, Syria, and Meſopotamia; and at length eſtabliſhing a conſiderable principality, which attained its height of eminence and power in the reign of Abu Dhâher, famous for the capture of Mecca, and the indignities offered by him to its temple; but it ſoon after declined and came to nothing. The Iſmaelians of Aſia reſembled the Karmatians, if they were not a branch of them. Theſe Iſmaelians, in 483, poſſeſſed themſelves of Al Jebâl, in the Perſian Irak, under the conduct of Haſan Sabah; and this prince, with his deſcendants, enjoyed the ſame for 171 years, till the whole race of them was deſtroyed by Holagu the Tartar. D'Herbelot. Sale's Koran.

KARMIN, in *Geography*, a town of Perſia, in Segeſtan; 25 miles N.E. of Zareng.

KARMOE, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 59 10′.

KARMSUND, a ſtrait in the North ſea, between the iſland of Carmen and the coaſt of Norway.

KARMUK, a town of Curdiſtan, on the ſide of the lake Van; 22 miles N.N.E. of Betlis.

KARNAC. See CARNAC.

KARNE, a town of Africa, in the kingdom of Bornou.

KARNICAR, a town of Grand Bucharia; 20 miles N. E. of Termed.

KARNKOWSKI, STANISLAUS, in *Biography*, celebrated as a Poliſh writer and ſtateſman, was born in 1525. He was educated for the church, and obtained a biſhopric about the year 1563, and upon the death of Sigiſmund Auguſtus, king of Poland, in 1572, he promoted the election of Henry of Valois, and, on his reception, made an eloquent harangue to him in the name of the ſtates. After the abdication of this prince, Karnkowſki nominated Anne, the ſiſter of the late Sigiſmund, queen of Poland, and crowned her huſband, Stephen Battori, upon the refuſal of the primate to perform this office. After this he placed the crown on the head of Sigiſmund III. prince of Sweden, who was acknowledged by the kingdom. He had already ſucceeded to the primacy, and, in 1590, he joined a party who were in oppoſition to the great chancellor, Zamoiſky, and convoked an extraordinary aſſembly at Kiow, in which he endeavoured to cancel the ordinances of the laſt diet. This ſtep rendering him unpopular, he was obliged to ſeek a reconciliation with the chancellor. He died in 1603, at the age of ſeventy-eight, and was interred in the Jeſuits' college at Kaliſh, which he had founded. As an inſtructor of youth he did much to reform the ſyſtems of education: but as an author he is known by "Hiſtoria Interregni Polonici," being a relation of the affairs of the interregnum ſucceeding the abdication of Henry of Valois: "De Jure Provinciarum, Terrarum, Civitatumque Pruſſiæ:" "Epiſtolæ Illuſtrium Virorum, lib. iii." This collection of letters is very rare, and is ſaid to contain many important particulars relative to the hiſtory of Poland, from 1564 to 1577.

KARNOWL, in *Geography*, a town of Hindooſtan, in Bahar; 38 miles N.N.W. of Hajypour. N. lat. 26° 17'. E. long. 85° 11'.

KAROLI, JASPER, in *Biography*, a Hungarian divine, who flouriſhed towards the cloſe of the ſixteenth century, was held in high eſtimation for his talents as a philoſopher, theologian, and philologiſt, and much admired as a preacher. His memory is greatly revered on account of his having tranſlated the bible from the original Hebrew into his native language. This work was publiſhed at Hanover, in 4to., in the year 1608, and another impreſſion of it was given to the public from the preſs at Frankfort, in 8vo., by Albert Molnar. The work has been reprinted very frequently, in different countries, and is ſtill held in high eſtimation.

KAROLOU-KALA, in *Geography*, a town of Turkiſh Armenia; 42 miles E. of Erzerum.

KAROP, a town of Ruſſia, in the government of Novgorod Sieverſkoi; 28 miles S. of Novgorod Sieverſkoi.

KAROS, an iſland in the Grecian Archipelago, ſix miles in circumference; 6 miles S.E. of Naxia. N. lat. 36° 53'. E. long. 25° 39'.

KAROTTA, a ſmall iſland in the Pacific ocean, belonging to the cluſter called Meanges. N. lat. 5°. E. long. 126° 50'.

KAROULI, a town of European Turkey, in Beſſarabia; 68 miles S.W. of Bender.

KARPILAX, a town of Sweden, in Tavaſtland; 14 miles N.E. of Jamſio.

KARPILOWKA, a town of Poland, in the palatinate of Kiev; 8 miles N.N.W. of Kiev.

KARRIARPOUR, a town of the circar of Gohud; 16 miles N. of Gohud.

KARRIETEN, a town of Arabia, in Yemen; 20 miles S.S.E. of Chamir.

KARROO, a Hottentot name given, in the colony of the Cape of Good Hope, to vaſt plains, which are interpoſed between the great chains of mountains. Out of their impenetrable ſurfaces of clay, gliſtening with ſmall cryſtals of quartz, and condemned to perpetual drought and aridity, not a blade of graſs, and ſcarcely a verdant twig, occurs to break the barren uniformity. The hills, by which theſe ſurfaces are ſometimes broken, are chiefly compoſed of fragments of blue ſlate, or maſſes of feltſpar, and argillaceous ironſtone; and the ſurfaces of theſe are equally denuded of plants as thoſe of the plains. Yet, Mr. Barrow obſerves, that wherever the Karroo plains are tinged with iron, and water can be brought upon them, the ſoil is found to be extremely productive. Barrow's Africa, vol. ii. p. 32.

KARS, a town of Aſiatic Turkey, in Aladulia; 25 miles N N.E. of Adana.—Alſo, a town of Perſia, in the province of Kerman; 20 miles N. of Sirjian. This is the extreme town on the frontiers of Perſia, and though an inconſiderable place, is tolerably fortified.

KARSABOO, a town of Africa, in Bambarra. N. lat. 13° 10'. W. long. 5° 35'.

KARSAMAKI, a town of Sweden, in the government of Ulea; 65 miles S. of Ulea.

KARSEK, an iſland near the weſt coaſt of Eaſt Greenland. N. lat. 60° 35'. W. long. 45° 20'.

KARSHAGNI, a fiery expiation among the Hindoos, of which the following account is taken from Moor's Hindoo Pantheon. "Cow-dung is a great purifier on ſeveral occaſions. It is related in the Agni-purana, that a moſt wicked perſon, named Chanyaka, had exceeded every known poſſibility of ſalvation. At the court of Indra were aſſembled gods and holy men; and as they were diſcourſing on ſuch enormities, Indra, in anſwer to a pointed queſtion, ſaid that nothing certainly could expiate them except the karſhagni. It happened that a crow, named, from her friendly diſpoſition, Mitra-kaka, was preſent; and ſhe immediately flew and imparted the welcome news to the deſpairing ſinner, who immediately performed the karſhagni, and went to heaven. This expiation conſiſts in the victim covering his whole body with a thick coat of cow-dung, which, when dry, is ſet on fire, and conſumes both ſin and ſinner. Until revealed by the crow, this potent expiation was unknown; and it has ſince been occaſionally reſorted to, particularly by the famous Sankara-Charya. The friendly crow was puniſhed for her indiſcretion; and forbidden, and all her tribe, aſcenſion to heaven, and was doomed on earth to live on carrion." P. 143. See SANKARA-CHARYA.

KARSKOI, in *Geography*, a ſettlement of Ruſſia, in the government of Archangel, at the mouth of the Kara; 600 miles E N.E. of Archangel. N. lat. 68° 35'. E. long. 64° 14'.

KARSKOI *Sea*, that part of the Frozen ocean which lies between the continent of Ruſſia and Nova Zembla, extending from N. lat. 70° to 75°, and from E. long. 61° to 68°.

KARSKOI *Gulf*, is a large bay of the Frozen ocean, lying to the ſouth of the Karſkoi ſea. N. lat. 68° to 70°. E. long. 62° to 69°.

KARSTORP, a town of Sweden, in the province of Smaland; 48 miles S.E. of Jonkioping.

KARSTULA, a town of Sweden, in the government of Waſa; 85 miles E. of Waſa.

KARSUN, a town of Ruſſia, in the government of Simbirſk; 60 miles W.S.W. of Simbirſk.

KARSURUSK, a town of Eaſt Greenland. N. lat. 61° 10'. W. long. 45°.

KARSYTSIAK, a town of Eaſt Greenland. N. lat. 60° 16'. W. long. 43°.

KARTAL, a town of Aſiatic Turkey, in Natolia, on the coaſt of the ſea of Marmora; 40 miles W. of Iſmid.

KARTAN, or Martan, four ſmall iſlands in the Arabian ſea, at the entrance of the gulf of Curia Muria, bounding it on the S.W. N. lat. 17° 30′. E. long. 54° 50′.

KARTASCHEN, a town of Ruſſia, in the government of Tobolſk, on the Irtiſch; 48 miles S. of Tara.

KARTBIRT, a town of Aſiatic Turkey, in Diarbekir; 48 miles W.N.W. of Diarbekir.

KARTERON, a town of Syria, on the Euphrates; 10 miles S. of Oſara.

KARTES, a town of Africa, in the country of Whidah; 12 miles E. of Sabi.

KARTIKYA, in *Hindoo Mythology*, the offspring of Siva, whoſe ſeed falling through the hands of Agni, the god of fire, into the Ganges, has given riſe to other names alluſive to his birth, of a very extravagant nature if taken literally, but which are moſt likely aſtronomical allegories; he is hence called Agni-bhuva, and Ganga-putra. Kumara, Srimana, and Skanda are others of his names. He aroſe, ſay the Puranic legends, on the banks of the Ganges, as bright as the ſun, and beautiful as the moon; and it happening that ſix daughters of as many rajas going to bathe, ſaw the boy; and each calling him her ſon, and offering the breaſt, the child aſſumed ſix mouths, and received nurture from all, whence he was called Seſhti-matriya, that is, having *ſix mothers*. Other legends relate, that on the birth of the child he was delivered to the Pleiads to be nurſed. The Hindoos reckon but ſix bright ſtars in that conſtellation, which is named *Kritika*. Theſe ſix offering their breaſts, "the ſix-headed was nurtured, and named Kartikya, the deſcendant of the Kritikas." See Kritika.

He is, however, generally eſteemed the ſecond ſon of Siva and Parvati, the god of war, and commander of the celeſtial armies, and ſir William Jones, who ſpells his name Carticeya, deems him to be clearly the Orus of Egypt and the Mars of Italy; and was convinced that the name Skanda, by which he is called in the Puranas, has ſome connection with the old Sekander of Perſia, whom the poets ridiculouſly confound with the Macedonian. He is uſually repreſented with ſix heads and ſix arms, and ſometimes mounted on a peacock. Several plates of him are given in Moor's Hindoo Pantheon; where, and in Aſ. Reſ. vol. i. and Maurice's An. Hiſt. are many particulars of this warlike deity, from Puranic legends and other authorities. His ſakti, or conſort, is always called Kaumari, after his name of Kumara.

KARTUNSAI, in *Geography*, a ſmall iſland in the gulf of Finland. N. lat. 60° 30′. E. long. 27°.

KARTUSH, a town of Turkiſh Armenia, in the government of Cars; 52 miles N.E. of Ardanoudji.

KARTUTA, a town of Sweden, in the government of Kuopio; 20 miles W. of Kuopio.

KARVIA, a town of Sweden; in the government of Abo; 47 miles N.N.E. of Biorneborg.

KARUN, a town of Perſia, in the province of Chuſiſtan; 70 miles S. of Suſter.

KARUNA, a town of Sweden, in the government of Abo; 13 miles S.S.E. of Abo.

KARUP, a town of Denmark, in North Jutland; 14 miles N.W. of Aalborg.—Alſo, a town of Sweden, in the province of Halland; 15 miles S. of Halmſtadt.

KARZALA, a town of Ruſſia, in the government of Saratov, on the Choper; 80 miles N.W. of Saratov.

KAS, or Guess, called alſo *Kyen* and *Queſche*, a low fertile iſland in the gulf of Perſia, ſeparated from the continent of Perſia by a good channel about 12 miles broad. N. lat. 26° 34′. E. long. 54° 4′.

Kas, *El*, or *Kas Kaſaron*, a mountainous cape of Egypt. on the coaſt of the Mediterranean; 3 miles N. of Catieh. N. lat. 30° 58′. E. long. 33° 22′.

KASABI, a town of Syria, on the Euphrates; 25 miles E. of El Der.

KASAKURA, a town of Japan, in the iſland of Ximo; 22 miles E.S.E. of Taiſero.

KASAN. See Kazan.

KASBAITE, or Gasbaite, a town of Algiers, anciently called *Satafa*; 50 miles S.W. of Conſtantina.

KASCHAN. See Cashan.

KASHGAR. See Cashgar.

KASCHIL, a town of Africa, in the kingdom of Benguela.

KASCHIN, a town of Ruſſia, in the government of Tver; 60 miles N.E. of Tver.

KASCHIRA, a town of Ruſſia, in the government of Tula; 56 miles N. of Tula.

KASCHKARANTZI, a town of Ruſſia, in the government of Archangel, on the White ſea; 140 miles N.W. of Archangel.

KASHAKLU, a town of Aſiatic Turkey, in Caramania; 55 miles S.W. of Cogni.

KASHAN. See Cashan.

KASHEKA, in the hiſtoric legends of the *Hindoos*, is the father of a very renowned aſcetic and ſage named *Viſwavitra*; which ſee.

KASHMIR, in *Geography*. See Cashmire.

KASI, or Kassi, ſometimes written *Kaſhi*; a Sanſcrit name of the revered city of Benares; the latter popular name being probably a corruption of its claſſical appellation Vara-nari, ſo called from two rivers that form a junction of waters and name near its ſcite. See Benares.

Kasi, a term in the Eaſt, applied to the fourth pontiff of Perſia, who is alſo the ſecond lieutenant civil, and judges of temporal as well as ſpiritual affairs.

He has two deputies, who determine matters of leſs conſequence; particularly quarrels ariſing in coffee-houſes, which make a great part of their buſineſs.

KASILAX, in *Geography*, a town of Sweden, in the province of Savolax; 29 miles E. of Nyſlot.

KASIMOV, a town of Ruſſia, in the government of Riazan, on the Oka, formerly the reſidence of a Tartar prince; 76 miles E.N.E. of Riazan.

KASKAREL Melik, a town of the Arabian Irak; 36 miles N. of Bagdad.

KASKASKIAS, a poſt-town of America, and the chief of Randolph county, on the S.W. bank of a river of the ſame name, 12 miles from the mouth of the river; containing about 100 houſes, many of which are well built with ſtone; and 467 inhabitants, of whom 47 are ſlaves.—Alſo, an Indian nation near the river of this name in the Indiana territory. In 1774 they could furniſh 250 warriors. Three miles northerly of Kaſkaſkias is a village of Illinois Indians, of the Kaſkaſkias tribe, containing, in 1774, about 210 perſons and 60 warriors. They were formerly brave and warlike, but are now degenerated and debauched. In Auguſt 1803, governor Hamilton concluded a treaty with the Kaſkaſkias Indians, by which they ceded to the United States in full right the immenſe tract of country extending from the mouth of the Illinois river to the mouth of the Ohio; from thence to the mouth of the Saline creek, below the Wabaſh; thence bounded by the highlands, dividing the waters which run into the Wabaſh from thoſe which run into the Saline creek; thence by the highlands dividing the waters which run into the Wabaſh from thoſe which run into the Miſſiſippi, until it reaches the river Kaſkaſkia; thence, by the highlands, which divide the waters that fall into the Kaſkaſkia river from thoſe which fall into the river Illinois, and from thence in a direct courſe to the mouth of the Illinois again; ſuppoſed to contain from 10 to 12 millions of acres. The whole was ceded in conſideration of the annual addition of 500 dollars to a like ſum, which by the treaty of Greenville, the Kaſkaſkia tribe receives every year from the United States, together with the reſervation of 1580 acres near the village of Kaſkaſkia, for cultivation and domeſtic purpoſes. Morſe.—Alſo, a river of the north-weſt territory, which is navigable for boats 130 miles. Its courſe is S.S.W., and near its mouth it turns to the S.S.E. and falls into the Miſſiſippi river, 84 miles from the Illinois. It runs through a rich country, abounding in extenſive natural meadows, and numberleſs herds of buffaloes, deer, &c. Along the eaſt ſide of the river lie high grounds, the banks being compoſed of lime-ſtone and free-ſtone, and from 100 to 130 feet high, divided in many places by deep cavities, through which many ſmall rivulets paſs before they fall into the Miſſiſippi. The ſides of theſe hills fronting the river are in many places perpendicular, and appear like ſolid pieces of maſonry, of various colours, figures, and ſizes. Morſe.

KASKASKUNK, a town of the Delawares, between Great Beaver creek and Alleghany river, in Pennſylvania; 40 miles N. of Pittſburg.

KASKEIRA, a town of Perſia, in the province of Irak; 25 miles N. of Sava.

KASKINOMPA, a ſmall river which runs W. into the Miſſiſippi from Teneſſee, in N. lat. 36° 28′. On the north ſide of its mouth is an iron mine.

KASKIS, a town of Sweden, in Tavaſtland; 30 miles E. of Tavaſthus.

KASKO, a ſmall iſland in the gulf of Bothnia, near the coaſt of Finland. N. lat. 63° 16′. E. long. 90° 10′.

KASKOYAR, a ſmall iſland in the gulf of Bothnia. N. lat. 63° 16′. E. long. 90° 10′.

KASNICH, a town of Perſia, in the province of Khoraſan; 12 miles S. of Zauzan.

KASR, a town of Egypt; 6 miles N.N.W. of Aſhmounein.

Kasr *Ahmed*, a town of Tripoli, on the coaſt; 100 miles E. of Tripoli. N. lat. 32° 4′. E. long. 15° 20′.

Kasr *Kiaſſera*, a town of Egypt, built on the ruins of the ancient Nicopolis, on the coaſt of the Mediterranean; 5 miles N.E. of Alexandria.

KASSAN, a town of Africa, in the kingdom of Yani, on the N. ſide of the Gambia; 36 miles N.W. of Piſania.

KASSAR, an iſland of the Baltic, to the ſouthward of Dago, with a chapel, about 11 verſts long and between four and ſeven verſts broad.

KASSERAMANGALUM, a town of Hindooſtan, in Baramaul; 17 miles S. of Coveriporum.

KASSGUNGE, a town of Hindooſtan, in the Dooab; 24 miles N.W. of Pattiary.

KASSINA, or Cashna, a kingdom of Africa, ſituated N. of the river Niger, between Bornou and Tombuctoo. The two empires of Bornou and Kaſſina extend northwards towards Nubia, and comprehend a very conſiderable ſpace. In both theſe empires, the ſovereigns are Mahometans; but their ſubjects are ſaid more generally to adhere to the ancient worſhip; that is to ſay, the lower orders are, almoſt univerſally, Negroes. Kaſſina, till of late, was eſteemed the firſt in power; but though a thouſand villages and towns are ſtill included in its vaſt domains, this empire is now conſidered much inferior to Bornou. The circumſtances of ſoil and climate, and thoſe alſo which conſtitute political character, are nearly the ſame in both; their prevailing winds are the ſame; their rains, which are periodical in each, though much more profuſe in Bornou, begin at the ſame ſeaſon; the ſame grains are cultivated; the ſame fruits (generally ſpeaking), are produced; and except that no camels are bred to the weſtward of the city of Kaſſina, the capital of the empire, the ſame animals are reared. In both, the complexion of the inhabitants is black; their mode of building too is ſimilar, and their manners, though in ſome reſpects more civilized in Bornou, have a general reſemblance. Each of the two empires is formed by the ſubjection of different tribes or nations to the dominion of one ruling people. The nature of the government, and the laws which regulate its ſucceſſion, are the ſame in both. In both, the ruling people are Mahometans; in both, the dependent nations are compoſed of converts to the Muſſulman faith, and of adherents to the ancient worſhip; and though at preſent their languages are different, the conquerors in both had probably the ſame original. The word Soudan, expreſſing the land of the Blacks, is by the Arabian geographers applied to the Nigritia of European geographers; but ſome Africans reſtrict it to the empire of Caſhna, which is N. of the Niger, and others extend it to the Negro ſtates on the S. of the river; and wiſhing to expreſs the tranſcendent power and extended rule of the emperor of Caſhna, they call him, with extravagant compliment, the ſultan of all Soudan. His real ſovereignty is bounded on the N. by the mountains of Eyré, and by one of thoſe diſtricts of the great Sahara, that furniſh no means of uſeful property or available dominion; on the S. by the Niger; and on the E. by the kingdom of Zamphara, and the empire of Bornou. Its weſtern limit is not aſcertained. There are ſome circumſtances of difference, which, notwithſtanding the general reſemblance between Bornou and Caſhna, diſcriminate between them. The rains are leſs violent in the latter than in the former. Caſhna excluſively furniſhes the Biſhnah, a ſpecies of Indian corn, that differs from the gamphúly in the blended colours of red and white which diſtinguiſh its grain. Its monkies and parrots (animals ſeldom ſeen in Bornou) are numerous, and of various ſpecies. The meridian of its capital is conſidered as a weſtern limit, in that parallel of latitude, to the vegetation of grapes and breeds of camels; for between Caſhna and the Atlantic few camels are bred, and no grapes will grow. The manners of the common people are leſs courteous in Caſhna than in Bornou; and their games are leſs expreſſive of reflection; for their favourite play conſiſts in toſſing up four ſmall ſticks, and counting thoſe that croſs each other, as ſo many points of the number that conſtitutes the game. But the circumſtances of chief diſcrimination between the two empires, are thoſe of language, currency, and certain articles of commerce. Many words occur in one language which are not found in the other. The currency of Caſhna, like that of the Negro ſtates S. of the Niger, is compoſed of thoſe ſmall ſhells called cowries. Of theſe ſhells, 2500 are eſtimated as equal in value to a miktal of Fezzan, which is worth about 75 piaſtres of Tripoli, or 10*s.* 1½*d.* ſterling. Among the few circumſtances which characterize the trade of Caſhna, as diſtinguiſhed from that of Bornou, the moſt remarkable is, that the merchants of the former kingdom are the ſole carriers to other nations, of a ſcarce and moſt valuable commodity, which is only to be obtained from the inhabitants of the latter. For though the ſalt of Bornou ſupplies the conſumption of Caſhna, and of the Negro kingdoms to the ſouth, yet its owners have abandoned to the commercial activity of the merchants of Agadez the whole of that profitable trade. The lakes, on the dreary ſhores of which this ſcarce article of African luxury is found, are ſeparated from Agadez by a march of 45 days, and are encompaſſed on all ſides by the ſands of the vaſt deſart of Bilma, where the ardent heat of a flaming ſky is returned with double fierceneſs by the ſurface of the burning ſoil. A thouſand camels, bred and maintained for the purpoſe, are ſaid to compoſe the caravans which annually explore, in the ſavage wilderneſs, the long line of this adventurous journey. Perilous however, and full of hardſhips as their labour is, the merchants find an ample recompence in the profits of their commerce; for while the wretched villagers who inhabit the neighbourhood of the lakes, and collect the ſalt that congeals upon the ſhores, are contented to receive, or obliged to accept a ſcanty price, the value which the merchants obtain in the various markets of Caſhna, Tombuctoo, and of the countries S. of the Niger, is ſuited to the high eſtimation in which the article is held. The people of Agadez are equally anxious to avail themſelves of the productions of their own country. Accordingly, being well appriſed of the ſuperior quality of the ſenna, which grows upon theſe mountains, they demand and receive from the merchants of Fezzan a proportionable price. From Tripoli this ſenna is conveyed to Turkey, Leghorn, and Marſeilles. Of the other articles of ſale which the extenſive empire of Kaſſina affords, the principal are gold-duſt, ſlaves, cotton cloths, which are the general manufacture of Caſhna, Bornou, and the Negro ſtates S. of the Niger, goat-ſkins of the red and yellow dyes, ox and buffalo hides, and civet; and in return for theſe, the inhabitants of Kaſſina receive cowries, horſes, and mares, red woollen caps, check linens, light coarſe woollen cloths, baize, barakans or alhaiks, ſmall Turkey carpets, plain Meſurata carpets, ſilk, wrought and unwrought, tiſſues and brocades, ſabre blades, Dutch knives, ſciſſors, coral, beads, ſmall looking-glaſſes, tiches, or a paſte prepared in Fezzan, from dates and the meal of Indian corn, and which, whenever they travel, is in great requeſt among the people of Fezzan; and Gooroo nuts, which are brought from the Negro ſtates on the S. of the Niger, and which impart a pleaſant bitter to any liquid in which they are infuſed.

The Fezzaners, equally connected by their commerce with Caſhna and Bornou, diſpatch to the former as well as to the latter, and always at the ſame ſeaſon, an annual caravan. From Mourzouk, their capital, which they leave at the cloſe of October, they take their courſe to the S.S.W. and proceed to the province of Hiatts, the moſt barren, and the worſt inhabited diſtrict of their country. From Hiatts they croſs the low mountains of Eyré, which ſeparate the kingdom of Fezzan from the empire of Caſhna, and next arrive at the town of Ganatt, where they repoſe for two days. From thence, by a march of 19 days, during ſix of which they are expoſed to the ſcorching heats of a thirſty deſart, they paſs on to the town of Aſſouda. On leaving Aſſouda, they traverſe a delightful country, fruitful, and populous; and while the exhilarating ſight of Indian corn, and of frequent herds of cattle accompanies and cheers their paſſage, the eighth day introduces them to the large and populous city of Agadez, the capital of an extenſive province. Diſtinguiſhed as the moſt commercial of all the towns of Caſhna, and, like Aſſouda and Ganatt, inhabited by Mahometans alone, Agadez naturally attracts the peculiar attention of the merchants of Fezzan. Many proceed no farther; but the greateſt part, committing to their agents the care of the ſlaves, cotton, and ſenna, which they purchaſe in the courſe of a 10 days' reſidence, continue their journey to the ſouth. In this manner, if the camels are completely loaded, 47 days, excluſive of thoſe which are allotted to refreſhment and neceſſary reſt, are employed in travelling from Mourzouk to Agadez. At the end of three days more, amidſt fields that are enriched with the luxuriant growth of Indian corn, and paſtures that are covered with multitudes of cows, and with flocks of ſheep and goats, the traveller reaches the ſmall town of Begzam; from which, through a country of herdſmen, whoſe dwellings are in tents of hides; the ſecond day conducts him to the town of Tegomah. There, as he ſurveys the ſtony, uninhabited, deſolate hills that form the cheerleſs proſpect before him, he caſts a regretful eye on thoſe verdant ſcenes that ſurrounded him the day before. Employed for two days in the paſſage of theſe dreary heights, he deſcends on the third to a deep and ſcorching ſand, from which he emerges at the approach of the fifth evening, and entering a beautiful country, as pleaſingly diverſified with the natural beauties of hills and vales and woods, as with the rich rewards of the huſbandman's and the ſhepherd's toil, he arrives in ſeven days more at the city of Caſhna, the capital of the empire of which it bears the name. and the uſual reſidence of its powerful ſultan.

The river Niger traverſes the empire of Caſhna with ſuch rapidity, that no veſſel can aſcend its ſtream; and ſuch is the want of ſkill, and ſuch the abſence of commercial inducements among the inhabitants of its borders, that even *with* the current, neither veſſels nor boats are ſeen to navigate. In one place, indeed, the traveller finds a paſſage for himſelf and his goods; but even there, though the ferrymen, by the indulgence of the ſultan of Caſhna, are exempted from all taxes, the boat which conveys the merchandize is nothing more than an ill-conſtructed raft; for the planks are faſtened to the timbers with ropes, and the ſeams are cloſed, both within and without, by a plaiſter of tough clay. The depth of the river, at the place of paſſage, which is more than 100 miles to the ſouth of the city of Caſhna, is eſtimated at 23 or 24 feet Engliſh. (Proceedings of the African Aſſociation.) The city of Caſhna, or Kaſſina, is diſtant 650 miles W.S.W. from Bornou, and 690 miles E.S.E. from Tombuctoo. N. lat. 16 30'. E. long. 11° 34'.

KASSON, a ſtrong hilly country of Africa, of ſmall extent, bounded on the N. by the Moors of Jaffnoo, on the E. and S.E. by Kaarta, on the S. by the Senegal, and on the W. by Kajaaga; about 50 miles from N. to S., and nearly the ſame from E. to W. N. lat. 14° to 15°. W. long. 8° to 9°.

KASSUTO, an African muſical inſtrument, compoſed of a hollow piece of wood, about an ell long, covered with a plate cut into a kind of ſcale, upon which the negroes beat with a ſtick. See *Muſic of the* Negroes.

KAST, in *Geography*, a town of Perſia, in Segeſtan; 40 miles S.W. of Arokhage.

KASTANOVITZ, a town of Croatia, ſituated on an iſland in the river Unna; 50 miles S.E. of Carlſtadt.

KASTHOLM, a town of Sweden, on the S.E. coaſt of the iſland of Aland.

KASTRICAUR, Cape, a cape on the N.E. coaſt of the Company's iſland, in the North Pacific ocean. N. lat. 46° 30'. E. long 151° 40'.

KASTRIL, in *Zoology*. See Kestril.

KASYA, in *Hindoo Mythological Hiſtory*, was the Guru, or ſpiritual preceptor of Kriſhna, of whoſe wife the following legend occurs in the Pedma Purana, and in the Sri Bhagavat among the ſtrange miracles recorded of this incarnate deity. She complained to Kriſhna that the ocean had ſwallowed up her children on the coaſt of Gurjura, or Guzerat, and ſupplicated their reſtoration. Kriſhna, proceeding to the coaſt, was aſſured by Varuna, the regent of the ocean, that not he, but the ſea-monſter, Sankaſura, had ſtolen the children. Kriſhna fought, and after a violent conflict, ſlew the demon, and tore him from his ſhell, named Panchajanya, which he bore away in memorial of his victory, and uſed afterwards in battle by way of trumpet. (See SANKASURA.) Not finding the children in the dominions of Varuna, he deſcended to the infernal city, Yama-puri, and ſounding his tremendous ſhank, or ſhell, (ſee SHANK,) ſtruck ſuch terror into Yama, that he ran forth to make his proſtrations, and reſtored the children of Kaſya, with whom Kriſhna returned to their delighted mother.

KASYAPA, an important character, who, in different theogonies, aſſumes different lines of parentage and character. In the Siva-purana he is made the great-grandſon of Brahma, Marichi and Bhrigu being his immediate anceſtors: and he is there feigned to have married thirteen of Dakſha's ſixty daughters, an aſtronomical allegory that has not yet been explained; but alluding, we apprehend, to a cycle of ſixty years in all among the Hindoos. Sir William Jones ſuſpected, and Mr. Wilford has proved the whole fable of Kaſyapa to be aſtronomical, and the ſame with the Caſſiopeia of the Greeks. Kaſyapa, in ſome points, correſponds in character with Uranus; Marichi, the offspring of Brahma, being a perſonification of Light. Surya, or the Sun, is ſometimes found mentioned as the ſun or offspring of Kaſyapa, and ſometimes he is included in the liſt of the ſeven Riſhis; in other relations he is the huſband of Diti, and the parent of Indra, Aruna, Garuda, and many of the minor deities. In Viſhnu's avatara of Vamana, or the dwarf, he became incarnate in the perſon of Kaſyapa's ſon, by Aditi; and the Nakſhatras, or lunar manſions, (ſee NAKSHATRA,) are, in the Inſtitutes of Menu, attributed to "Kaſyapa, the firſt production of Brahma's head."

KATABA, in *Geography*, a town of Arabia, in the province of Yemen, ſituated in a fertile country, near a river that runs into the ſea at Aden, governed by a dola, and defended by a citadel; 75 miles N. of Aden. N. lat. 13° 54′. E. long. 44° 39′.

KATAL, a town of Aſiatic Turkey, in the government of Sivas; 18 miles S. of Sivas.

KATAPANG, a ſmall iſland in the Eaſt Indian ſea, near the N. coaſt of Java. S. lat. 7° 39′. E. long. 113° 22′.

KATAREN, a town of Arabia, in the province of Yemen; 60 miles S. of Saade.

KATENIA, a town of Bengal; 80 miles N. of Dacca.

KATEREVI, a town of the principality of Georgia; 18 miles W.S.W. of Teflis.

KATERINENSCHSTAT, a town of Ruſſia, in the government of Saratov, on the Volga; 32 miles N.E. of Saratov.

KATHTIPPACAMUNCK, an Indian village in America, on the N. ſide of Wabaſh river, at the mouth of Rippacanoe creek, and about 20 miles above the Lower Weau towns. In 1791, before its deſtruction by generals Scott and Wilkinſon, it contained 120 houſes, the beſt of which belonged to the French traders. N. lat. 40° 20′. W. long. 87° 2′.

KATIF, a town of Arabia, in the province of Lachſa, of ſome magnitude, ſituated upon the coaſt, at the diſtance of about five German miles from the iſle of Bahhrein. The inhabitants earn their ſubſiſtence by the pearl fiſhery; the ſeaſon for fiſhing is in the hotter months of the year, when the air is deemed to be very inſalubrious.

KATIMBEVOLE, a town of the iſland of Ceylon; 36 miles S. of Candy.

KATIMTUMU, a town of Ruſſia, in the government of Irkutſk, on the Lena; 60 miles E. of Olekminſk.

KATIRLI, a town of Natolia; 28 miles N. of Burſa.

KATISTI, a town of Natolia, on the coaſt of the ſea of Marmora; 36 miles S. of Conſtantinople.

KATKIN. See CATKIN.

KATMANDU, or CATMANDU, in *Geography*, the capital of Napaul or Nepal, in a province of the ſame name; called alſo Jingbu by the people of Thibet. It is placed by Rennell 105 geographical miles nearly N. from Maiſſy, that is, in latitude 28° 6′. It is 536 Britiſh miles from Laſſa, or in horizontal diſtance 346 geographical miles. According to Giuſeppe, it contains about 18,000 houſes, probably yielding a population of 70 or 80 thouſand. (See NEPAUL.) According to colonel Kirkpatrick's account it is ſeated on the eaſtern bank of the Biſhmutty, along which it runs for a mile, with a breadth not exceeding half a mile. The moſt ſtriking objects which it preſents to the eye are its wooden temples, which are ſcattered over its environs, and particularly along the ſides of a quadrangular tank or reſervoir. The colonel ſays, "there are nearly as many temples as houſes, and as many idols as inhabitants." The number of idols, according to his ſtatement, amounts to 2733. Beſides theſe wooden temples, Katmandu contains ſeveral others on a large ſcale, conſtructed of brick, with two or three ſloping roofs, diminiſhing as they aſcend, and terminating in pinnacles, which, as well as ſome of the ſuperior roofs, are ſplendidly gilt, and produce a very pictureſque and agreeable effect. The houſes are of brick and tile, with pitched roofs towards the ſtreet, frequently ſurrounded by wooden balconies, of open carved-work, and of a ſingular faſhion. They are of two, three, or four ſtories, and generally of a mean appearance. The ſtreets are narrow and filthy. Katmandu, with its dependent towns and villages, according to Kirkpatrick, may contain about 22,000 houſes; but the town itſelf, if ten people be allowed to each houſe, which he thinks to be a low computation, does not contain more than 50,000 perſons. The next moſt conſiderable towns of Nepaul are Patn, Bhetgong, and *Khirtipoor*. Aſiatic Ref. vol. ii. p. 307.

KATNA, a town of Sweden, in Sudermanland; 30 miles S.W. of Stockholm.

KATNEBLOW, a town of Poland, in the palatinate of Kiev; 36 miles S. of Bialacerkiew.

KATNIA-STANITZ, a town of Ruſſia, in the government of Irkutſk; 64 miles N.E. of Vitimſkoi.

KATOENE, a town of the iſland of Ceylon; 64 miles S. of Candy.

KATOU-CARVA, in *Botany*, the name by which ſome authors have called the tree, whoſe leaves are the tamalapatra, or Indian leaf of the ſhops. See MALABATHRUM.

KATOVINDEL, the name given by the authors of the Hortus Malabaricus, to a genus of plants, called by ſome *elate*, and by Linnæus *phœnix*.

KATOUN-SERAI, in *Geography*, a town of Aſiatic Turkey, in Caramania; 12 miles S. of Cogni.

KATSCHER, a town of Moravia, in the circle of Prerau, with a lordſhip in Sileſia, to which it once belonged; 12 miles W. of Ratibor. N. lat. 49° 59′. E. long. 17° 52′.

KATTA, a town of Bootan; 15 miles S. of Biſnee.—Alſo, a town of Perſia, in Farſiſtan; 30 miles W.S.W. of Yezd.

KATTAH, a town of Arabia, in the province of Hedſjas; 160 miles E.S.E. of Madian.

KATTAYANI, in *Hindoo Mythology*, a name of Parvati, conſort of Siva.

KATTRON, in *Geography*. See GATRON.

KATUADI, a town of the Arabian Irak; 12 miles S. of Bagdad.

KATUNSKAIA, a town of Ruſſia, in the government of Koliyan; 12 miles S. of Büſk.

KATZA, a town of Germany, in the county of Henneberg; ſeven miles W.N.W. of Meinungen.

KATZEMAUGE, in *Mineralogy*. See CAT's *Eye*.

KAU, in *Geography*, a town of Africa, in the kingdom of Loango.

KAUADI, an iſland of Egypt, in lake Berelos; 13 miles N. of Faoue.

KAVARNA, a town of European Turkey, in Bulgaria, in the gulf of Varna; 22 miles N.E. of Varna. N. lat. 43° 21′. E. long. 28° 17′.

KAUBUL, a town of European Turkey, in Beſſarabia; 34 miles W. of Akerman.

KAUDER, a town of Hindooſtan, in Lahore; 40 miles S.S.W. of Lahore.

Kauder, a town of Arabia, in the province of Hedſjas; 60 miles N.W. of Mecca.

KAVERZINA, a town of Ruſſia, in the government of Tobolſk, on the Tchiuna; 20 miles E.S.E. of Eniſeiſk.

KAUFFHEUREN, a town of Germany, ſituated on the Wuttach, and till the year 1802, when it was given to the elector of Bavaria, imperial. The burghers are partly Lutherans, and partly Roman Catholics; but its magiſtracy conſiſts of eight Lutherans and four Roman Catholics. In the town-court and great council are alſo two Roman Catholic members, but the reſt are all Lutherans; 62 miles E.N.E. of Conſtance. N. lat. 47° 42′. E. long. 10° 35′.

KAUFFMAN, Mary Angelica, in *Biography*, a lady who poſſeſſed the talents and taſte of a painter in a degree very unuſual among her ſex. She was a native of Coire, the capital of the Griſons, and born in 1740. Her father was an artiſt, who, perceiving the extraordinary capacity of his daughter, and how worthy it was of the beſt cultivation, conducted her, at the age of fourteen, to Milan, and afterwards to Rome; where her talents and accompliſhments ſoon acquired her the moſt diſtinguiſhed attention. It was the happy lot of lady Wentworth, the wife of the Britiſh reſident at Venice, to be the inſtrument of conveying Angelica to England in the year 1764. Here ſhe was received in a very flattering manner; her works eagerly ſought for; and her company ſolicited by the learned, the great, and the polite. She was honoured with royal attentions, and was eſteemed and courted by artiſts. She was very induſtrious, and painted the lighter ſcenes of poetry with a grace and taſte entirely her own; and happily formed to meet that of an engraver whoſe labours highly contributed to the growth and perpetuity of her fame. Bartolozzi was the man, who, enjoying at the ſame time youth, health, and ingenuity, almoſt entirely devoted his talents between Angelica and Cipriani. The three were endowed with congenial feelings in arts; which, if not of the higheſt claſs, were certainly entitled to rank among the moſt agreeable.

After ſome years reſidence here, ſhe was unhappily deceived by a footman of a German count, who, coming to England, perſonated his maſter, contrived to be preſented at court, and perſuaded Angelica to marry him. The cheat was ſoon diſcovered, and the raſcal had not the humanity to endeavour to ſooth her diſappointment by kindneſs, but treated her very ill. At laſt, however, by a payment made to him of 300*l*., he was induced to return to Germany, and promiſed never to moleſt her any more. He kept his engagement; and the lady not hearing of him for ſeven years, and concluding him dead, then married an Italian painter of the name of Zucchi, and having ſpent ſeventeen years in England, returned with him to her native country, and thence to Rome; where her houſe became the reſort of genius and taſte; all artiſts and cognoſcenti taking pleaſure in being admitted to her converſazioni; while amateurs endowed with rank and wealth were happy in finding employment for her agreeable talents, and in the poſſeſſion of her works. She lived to the age of 67, and then fell by a gradual decay, under that power which pays regard alike to the great, the learned, the virtuous, and the profligate. She died in 1807, univerſally regretted, and was honoured by ſplendid public obſequies.

The talents of Angelica were of a pleaſing rather than of a ſplendid kind. She excelled moſt, as was moſt juſtly to be expected, in the repreſentation of female characters. Her figures of men want form and energy, and their faces and characters are all of the ſame mould. Grace, eaſe, and ſuavity of expreſſion, generally mark her women; and to ſingle figures, ſuch as "Calypſo watching the Departure of Ulyſſes," or "Penelope weeping over his Bow," ſhe imparted the true intereſt of the ſtory.

KAUGA, in *Geography*, a town of Africa, in a kingdom of the ſame name, S. of Bornou, traverſed by the Niger. The town is ſituated on a lake, called by Ptolemy "Nubia Palus," in which ſome have ſuppoſed that the Niger loſes itſelf; 225 miles S.S.E. of Bornou. N. lat. 16° 10′. E. long. 24° 40′.

KAUGASNIEMI, a town of Sweden, in the province of Savolax; 35 miles N. of Chriſtina.

KAUHAJOKI, a town of Sweden, in the government of Waſa; 24 miles E.N.E. of Chriſtineſtadt.

KAUHAVA, a town of Sweden, in the government of Waſa; 37 miles E. of Waſa.

KAUHAUT, in *Biography*, an excellent performer on the lute, and perhaps the laſt eminent muſician who highly cultivated that inſtrument. Signor Colini was the laſt good performer on the lute in England. We believe that Kauhaut was a German; but he is enumerated by M. Laborde among French compoſers; he was in the ſervice of the prince of Conti, and compoſed between 1760 and 1764 ſeveral comic operas for the Theatre Italien at Paris. But in 1772 we found him at Vienna, in high reputation as a luteniſt.

KAUI, in *Geography*, a town of Perſia, in the province of Adirbeitzan; 48 miles N.W. of Tabris.

KAUKEBAN, a ſmall unfortified town of Arabia, in Yemen, but ſituated on the ſummit of an almoſt inacceſſible mountain. A cauſeway has been formed, by which loaded camels can now advance up to the city; 18 miles W. of Sana. The country bearing this name is ſurrounded almoſt on all ſides by the dominion of the Imam of Sana; only, on one ſide, it meets the territory of the confederated Scheichs of Haſchid-u-bekil. The reigning family are deſcendants from Mahomet, by Hadi, Imam of Saade. Although they have loſt the title of Imam, they ſtill retain ſovereign authority over a conſiderable territory.

KAUKENEN, a town of Pruſſian Lithuania, on the Kauke, which runs into the Curiſch Haff; 12 miles W.N.W. of Tilſit.

KAUMARI, in *Hindoo Mythology*, is the ſakti or conſort of Kumara, or Kartikya, and is repreſented riding on a peacock, with a lance in her hand. See Kartikya and Sakti.

KAUMBOLI, in *Geography*, a town of Hindooſtan, in the circar of Ellore; 12 miles S.S.W. of Ellore.

KAUNITZ, Wenzel Antony, in *Biography*, prince of the holy Roman empire, count of Rietberg, knight of the golden fleece, &c. was born at Vienna in 1711. Being a younger child of a large family he was brought up to the church; but on the death of his elder brothers he quitted the eccleſiaſtical profeſſion to enter into the ſervice of the ſtate, in which his anceſtors had made a conſiderable figure. He laid the foundation of his ſtudies at Vienna, and in 1737, was made a counſellor of ſtate, and, two years after, imperial commiſſioner at the diet of Ratiſbon. In the year 1742, he was appointed miniſter plenipotentiary to the court of Sardinia, which had entered into a new alliance with Auſtria. A treaty was brought to a concluſion by Kaunitz, which induced the court to confer on him offices of more importance. In 1744, he went to Bruſſels, to undertake the chief management of public affairs, which, at that time, required a man of talents, as the king of France had already declared war, and the Netherlands were the firſt part of the emperor's dominions expoſed to the attack of the French army. In February 1745, he was appointed miniſter plenipotentiary, and in 1748, he took a part in the ſigning of the preliminaries of peace at Aix-la-Chapelle. On this occaſion he acquired, by his great talents for negociation, and the noble conduct which he diſplayed, the reſpect of all the miniſters then preſent. When peace was concluded, the empreſs Mary Thereſa conferred upon him the order of the Golden Fleece, and appointed him envoy to Paris. During his reſidence in that city, he laid the foundation of an alliance between France and Auſtria, which took place ſome time after. On the reſignation of count Uhlfeld, as chancellor of ſtate, Kaunitz was appointed his ſucceſſor, and recalled from Paris about the end of the year 1752, but at the ſame time was ordered to return to Bruſſels, to bring to an end the negociations in regard to the barriers, which had been carried on a whole year without ſucceſs. When he had completed this object he returned to Vienna in 1753, and entered upon the official duties of the chancellorſhip of the ſtate, in addition to thoſe belonging to the ſupreme dictatorſhip of the affairs of the Netherlands and of Lombardy, with the rank of miniſter of ſtate, which he retained till his death. In 1764, he was raiſed to the dignity of prince of the empire, with deſcent to his heirs male. He concluded the treaty of alliance between France and Auſtria in 1766, which put an end to that hoſtility which had prevailed for ſeveral centuries between the two countries. After this he had the ſole management of all foreign affairs, and enjoyed the unlimited confidence of the empreſs Mary Thereſa, and afterwards of Joſeph II., Leopold II., and Francis II. He died in June 1794, in the 84th year of his age, leaving behind him a very high reputation. Gen. Biog.

KAUNITZ, in *Geography*, a town of Moravia, in the circle of Brunn; eight miles S.W. of Brunn.—Alſo, a town of Moravia, in the circle of Znaym; 11 miles N.N.W. of Znaym.

KAUNPOUR, a town of Hindooſtan, in Moultan; 15 miles N.E. of Moultan.

KAUNUDON, a town of Hindooſtan, in Lahore; 20 miles E.N.E. of Callanore.

KAVO, one of the ſmaller Molucca iſlands, five miles S. of Machian. N. lat. 0° 5′. E. long. 127° 24′.

KAUOS, a town of Grand Bucharia; 65 miles N. of Samarcand.

KAUR, a town of Perſia, in the province of Irak; ſix miles E. of Natens.

KAURABANG, a town of Candahar; 80 miles S.W. of Cabul.

KAURESTAN, a town of Perſia, in Lariſtan; 65 miles E.S.E. of Lar.

KAURYSAOUL, a body of ſoldiers who form the laſt of the five corps of the king of Perſia's guards.

They are in number two thouſand, and are all horſe, commanded by the conſtable, and in his abſence by the captain of the watch. They keep watch in the night around the palace, ſerve to keep off the crowd when the ſophi goes on horſeback, keep ſilence at the audience of ambaſſadors, ſeize the khans and other officers when diſgraced, and cut off their heads when the ſophi commands it.

KAURZIM, in *Geography*, a town of Bohemia, and capital of a circle of the ſame name, on a river which runs into the Elbe; the circle ſupplies Prague and other places with timber; 24 miles E.S.E. of Prague. N. lat. 49° 56′. E. long. 15° 5′.

KAUSZAN, a town of Beſſarabia, inhabited by Budziack Tartars; 12 miles S.S.E. of Bender.

KAUTEE, a town of Bengal; 14 miles E. of Toree.

KAUVERI, or KAVERI, in *Hindoo Mythology*, the ſakti or conſort of Kuvera, the deformed god of riches. The river in Myſore, in which is the iſland of Sri-rangapatan, or Seringapatam, uſually written Caveri, is named after this goddeſs. See KUVERA, and CAVERY.

KAWAH, in *Geography*, a town of Hindooſtan; in the circar of Ellichpour; 20 miles E. of Omrautty.

KAWAR, or KUAR, a country of Africa, lying to the northward of Kuku and Bornou, and extending eaſtward to Al W'ehat. It is bounded on the N. by that extenſive deſert which ſeparates Egypt from Fezzan, and which is the proper deſert of Libya; on the E. by Egypt, and on the W. by the deſert of Bilmah.

KAWOMURAH, a town of Japan, in the iſland of Niphon; 100 miles N.W. of Meaco.

KAWTAH, a town of Hindooſtan, in the circar of Singboom; 45 miles E. of Doeſa.

KAWUCK, or KHAWICK, the furtheſt, or moſt eaſtern, of the paſſes leading through Hindoo-Kho into the province of Cabul.

KAWUTZA, a town of Sweden, in the government of Abo; 25 miles S.E. of Biorneborg.

KAXHERTA, a town of Sweden, in the government of Abo, on an iſland in the gulf of Finland; five miles S. of Abo.

KAY, KEY, or *Quay*, a wharf or place by the waterſide, in a ſea-port, for the loading and unloading of merchandize.

The verb *cajore*, in old writers, according to Scaliger, ſignifies *to keep in* or *reſtrain;* and hence came our term *kay;* the ground where keys are made being bound in with planks and poſts.

The lawful keys and wharfs for the lading or landing of goods, belonging to the port of London are the following: *viz.* Cheſter's Key, Brewer's Key, Galley Key, Wool Dock, Cuſtom-houſe Key, Bear Key, Porter's Key, Sab's Key, Wiggan's Key, Young's Key, Ralph's Key, Dice Key, Smart's Key, Somer's Key, Hammond's Key, Lyon's Key, Botolph Wharf, Graunt's Key, Cock's Key, and Freſh Wharf; beſides Billingſgate, for landing fiſh and fruit; and Bridgehouſe in Southwark, for corn and other proviſions; but for no other goods or merchandize. Deal-boards, maſts, and timber, may be landed at any place between Limehouſe and Weſtminſter; the owner firſt paying or compounding for the cuſtoms, and declaring at what place he will land them.

KAYA, in *Geography*, a town of Cacongo. S. lat. 5° 20′. E. long. 12° 10′.

KAYADERE, a town of Aſiatic Turkey, near the W. coaſt of Natolia; five miles E.N.E. of Vourla.

KAYAGE, the money, or toll, paid for loading or unloading wares at kays.

KAYANG, in *Geography*, a river of the iſland of Celebes, which runs into Boni bay. S. lat. 4° 59′. E. long. 120° 40′.

KAYCOON Point, a cape on the W. coaſt of the iſland of Celebes. S. lat. 3° 22′. E. long. 129° 50′.

KAYDANOW, a town of Lithuania, in the palatinate of Minſk; 16 miles S.S.W. of Minſk.

KAYE, a town of Africa, in the kingdom of Loango; 10 miles N.W. of Loango.

Kaye's *Iſland*, an iſland in the N. Pacific ocean, near the W. coaſt of North America, diſcovered by Capt. Cook in his third voyage, May 1778, and thus named in honour of Dr. Kaye, late dean of Lincoln. It is 11 or 12 leagues in length, in the direction of N.E. and S.W.; but its breadth is not above a league, or a league and a half, in any part of it. The S.W. point, which lies in lat. 59° 49′, and long. 216° 58′, is a naked rock, conſiderably elevated above the land within it. Towards the ſea, the iſland terminates in bare ſloping cliffs, with a beach, a few paces wide, of large pebble ſtones, intermixed here and there with a browniſh clayey ſand. Parts of the ſhore are interrupted by ſmall vallies and gullies; in each of which a torrent ruſhes down with violence, which is furniſhed by the melted ſnow. Theſe vallies are filled with pine-trees, extending from the entrance to about the middle part of the iſland. This iſland is covered with a broad girdle of wood, ſpread upon its ſide, included between the top of the cliffy ſhore, and the higher parts in the centre. The trees are of diminutive ſize. About the wood were obſerved a crow, and white headed and white breaſted eagles; and fowls of various kinds were ſeen upon the water and near the ſhore. No animals were ſeen except a fox; nor were perceived any ſigns of inhabitants ever having been upon the iſland. Cooke's Third Voyage, vol. ii.

KAYEE, a town of Africa, in Kajaaga, on the Senegal. N. lat. 14° 30′. W. long. 9° 35′.

KAYKIYA, in *Hindoo Mythological Hiſtory*, is one of the three wives of Daſarat'ha, the father of Rama-chandra. About the period of the birth of the latter hero, Kaykiya, or Kahikeya, produced Lucins, his half brother, to aſſiſt him in the wars of Lanka or Ceylon, as detailed at great length in *Ramayana*, which ſee.

KAYMEN, in *Geography*, a town of Pruſſia, in the province of Samland; 12 miles E.N.E. of Konigſberg.

KAYMOURA, a town of Africa, in Bondou; 15 miles S.S.W. of Fatteconda.

KAYNS, a race of mountaineers in the Birman empire, perfectly diſtinct from the Carianers, and ſpeaking a language differing radically both from theirs and that of the Birmans. They were originally inhabitants of the Arracan mountains, whom the Birmans, ſince their conqueſt of that kingdom, have prevailed on, partly by force, and partly by mild treatment, to abandon their native hills, and ſettle on the plain. There are ſeveral ſmall ſocieties of theſe people eſtabliſhed near the foot of the mountains further north. The Carianers are not to be found higher up than the city of Prune.

KAYOO, a town of Africa, in Bambarra, on the Niger. N. lat. 13°. W. long. 4° 59′.

KAYOR, or Cayor, a kingdom of Africa, near the ſea-coaſt, between the rivers Gambia and Senegal.

KAYSERSWERT, a town of Germany, on the E. ſide of the Rhine, once fortified, but now without walls; for a long time annexed to the biſhopric of Cologne, but in the year 1762, reſtored to the elector palatine; 24 miles N. of Juliers. N. lat. 51° 16′. E. long. 6° 37′.

KAYUWAH, a town of Pegu, on the left bank of the Ava; 15 miles S. of Prome.

KAYZEVAN, a town of Turkiſh Armenia; 69 miles S.W. of Erivan.

KAZAKOVA, a town of Ruſſia, in the government of Irkutſk; 12 miles W. of Nertchinſk.

KAZAN, a city of Ruſſia, and capital of a government of the ſame name, ſituated on the Volga. In the Turkiſh and Tartarian languages, kazan ſignified a cauldron large enough to contain victuals for many perſons; and hence the name has been given by the Crim and Budziak Murſes to the families of their ſubjects or vaſſals, reckoning about 10 men to a kazan. This city conſiſts of a ſtrong fort, built with ſtone; the wooden town, as it is called; and ſeveral adjoining ſlobodes, or ſuburbs; and among them is one inhabited by Tartars, in which are four metſheds. Here are alſo ſeveral churches built with ſtone, and 11 convents in and near the town. The governor of the fort has the command of the garriſons and regiments; the garriſon of the city conſiſts of three regiments, for which a good hoſpital is provided. Kazan is alſo an archbiſhop's ſee. Here are alſo a manufacture of cloth, and a ſchool, in which are taught the Ruſſian and Latin languages, the principles of the Chriſtian religion, and the elements of philoſophy, in order to qualify preachers for the converſion of the nations to which they belong. This city was totally deſtroyed by fire in the years 1749 and 1752. Kazan was once the capital of a principal part of Tartary, and the ſeat of government, where the royal family reſided. The Ruſſians firſt made themſelves maſters of this important place on the 3d of October 1552; 400 miles E. of Moſcow. N. lat. 55° 45′. E. long. 49° 3′.

This khanate (ſee Kaptschak) ſubſiſted as a peculiar ſtate till the year above-mentioned, 1552, when it was conquered by czar Ivan II., and incorporated for ever with the Ruſſian empire. The city of Kazan had been built in the year 1257 by a ſon of Banty, nephew of Tſchingis-khan; and this khanate aſſerted its independency about the ſame time (1441) when the Krim disjoined itſelf from Kaptſchak. The preſent Kazan Tartars are but a feeble remnant of what they were, partly conſiſting of thoſe who remained in their old ſeats, and partly ſuch as ſettled as fugitives, in other diſtricts of Ruſſia. They principally dwell at preſent in the governments of Kazan, Simbirſk, Rieſan, Viatka, Perme and Ufa (particularly in the Orenburg diſtrict of that government); their number is upon the whole conſiderable, but in no degree proportionate to the idea we form of their ancient population, from hiſtorical accounts; for, as far as we are able to conclude from particular ſtatements, they cannot amount to much above 100,000. Theſe Tartars form the root of the native of Ruſſia; being not only unmingled, but alſo of a ſuperior civilization to moſt of the remaining branches of their brethren. Tooke.

KAZANOW, a town of Poland, in the palatinate of Sandomirz; 40 miles N.N.W. of Sandomirz.

KAZANSKAIA, a town of Ruſſia, in the country of the Coſſacks, on the Don; 100 miles S.S.E. of Veronetz.

KAZANSKOE, or *Government of* Kazan, a government of Ruſſia, bounded on the N. and N.E. by Viatſkoe, on the E. by Uphimſkoe, on the S. by Simbirſkoe, and on the W. by Niznei-Gorodſkoe; about 100 miles in length, and from 100 to 110 broad; the capital is Kazan.

KAZARON, a town of Perſia, in the province of Farſiſtan; 55 miles W.S.W. of Schiras. N. lat. 29° 44′. E. long. 51° 28′.

KAZIKIRAN, a town of Perſia, in the province of Adirbeitzan; 45 miles S.E. of Urmia.

KAZIMIERS. See Casimir.

KEA, a town of Africa, in the kingdom of Bambarra; 65 miles N.E. of Sego.

KEADUE, a poſt-town of the county of Roſcommon, province of Connaught, Ireland; 85 miles from Dublin.

KEADY, a market and poſt-town of the county of Armagh, province of Ulſter, Ireland, ſituated on the river Callan, along the banks of which, from Armagh to this place, are many conſiderable bleach greens, the linen manufacture being carried on here very extenſively. Keady is 50 miles N. from Dublin; and ſix S. from Armagh.

KEAJA, or Kiahia, is the name of the lieutenant of the chief officers of the Porte, or the ſuperintendant of their particular court.

KEALE, ſmall fragments reſembling chips or broken pieces of ſtone of various kinds; ſome of lime-ſtone, others of free-ſtone, and others of rag-ſtone, found mixed among the earth, of the upper ſtratum in many parts of this kingdom, and giving that ſoil the name of kealy; hence, ſome of theſe pieces of keale are thin and flat like bits of ſlate.

KEALY Soil, in *Agriculture*, is uſed by the huſbandmen for a ſort of land, plentifully ſtrewed with keale or kale.

KEANPAN Head, in *Geography*, a cape on the E. coaſt of the iſland of Lewis, forming the N.E. point of the peninſula of Aird. N. lat. 58° 15′. W. long. 6° 5′.

KEANGON, a town of Grand Bucharia; 75 miles N.W. of Anderab.

KEARAH, a town of Hindooſtan, in Bahar; 30 miles S.S.W. of Patna.

KEATE, George, in *Biography*, an entertaining and miſcellaneous writer, was born at Trowbridge, in Wiltſhire, in the year 1729. Having been educated at Kingſton, he repaired to Geneva, where he reſided ſome years, and contracted an intimacy with Voltaire. He made the tour of Europe, and returning to his native country, entered himſelf as ſtudent in the Inner Temple, and was in due time called to the bar, and ſometimes attended the courts in Weſtminſter Hall, though he did not practiſe, either on account of his want of encouragement, or for want of a degree of application ſufficient to make himſelf maſter of his profeſſion. His firſt literary performance was entitled, "Ancient and Modern Rome," a poem written at Rome in the year 1755. It was publiſhed in 1760, and was very well received by the public: he next produced "A ſhort Account of the Ancient Hiſtory, preſent Government, and Laws of the Republic of Geneva." In 1768 or 69, he publiſhed "Ferney," an epiſtle to Voltaire, in which he introduced a fine eulogium on Shakſpeare, which procured for him the compliment, from the mayor and burgeſſes of Stratford, of a ſtandiſh mounted with ſilver, made out of the mulberry-tree planted by that illuſtrious bard. In 1779, he publiſhed "Sketches from Nature, taken and coloured in a Journey to Margate," in two vols. 12mo. This, though an avowed imitation of Sterne's "Sentimental Journey," contains ſo many juſt ſtrictures on life and manners, enlivened by ſtrokes of genuine humour and delicacy of ſentiment, as to have been extremely popular, and it was thought that Sterne never had ſo happy an imitator as Keate. In 1781, he collected his poetical works, and publiſhed them in two volumes, which he dedicated to Dr. Heberden. The laſt, and his beſt production, and that which did moſt credit to his genius and liberality, was the "Account of the Pelew Iſlands," which he drew up and publiſhed in 1788. This work is written with great elegance, and compiled with much care: it had a conſiderable ſale, but the author drew it up from the moſt diſintereſted motives, and received no advantage from it whatever. He died in the year 1797, leaving behind him ſeveral other publications beſides thoſe already noticed. Gentleman's and Monthly Magazines.

KEATING, Geoffrey, an Iriſh hiſtorian, was a native of Tipperary, and flouriſhed in the earlier part of the ſeventeenth century. He was educated with a view to the duties of the Roman Catholic church, and having received at a foreign univerſity the degree of doctor of divinity, he returned to his native country, and became a celebrated preacher. Being well verſed in the ancient Iriſh language, he collected the remains of the early hiſtory and antiquities of the iſland, and formed them into a regular narrative. This work he finiſhed about the time of the acceſſion of Charles I. to the throne: it commences from the firſt planting of Ireland, after the deluge, and goes on to the 17th year of king Henry II., giving an account of the lives and reigns of one hundred and ſeventy-four kings of the Mileſian race. From the above circumſtances, our readers will readily ſuppoſe that this work is little better than fiction. Indeed the advocates of the author allege in his defence, that he has given his extraordinary relations merely as fables, and not as true hiſtory. It remained in MS. in the original language, till it was tranſlated into Engliſh by Dermot O'Connor, and publiſhed in London in 1723. A new edition was publiſhed in 1738, with plates of the arms of the principal Iriſh families. Keating died about the middle of the ſeventeenth century.

KEBAN, in *Geography*, a town of Aſiatic Turkey, in the province of Diarbekir; 70 miles N. of Diarbekir.

KEBER, the name of a ſect among the Perſians, who, in general, are rich merchants. See Gabres.

KEBET, in *Geography*, a ſmall iſland in the Eaſt Indian ſea. S. lat. 7° 10′. E. long. 130° 40′.

KEBLA, or Keblah, called alſo *Kebleh*, *Kiblah*, and *Alkebla*, among the Muſſulmen, denotes that point, or quarter, to which they turn themſelves when they ſay their prayers.

Mahomet, at firſt, durſt not propoſe any other kebla to his followers but the temple of Jeruſalem, which was the kebla of the Jews and Chriſtians. In the courſe of time, however, being willing to bring them off from any communication in matters of religion, with the Jews and Chriſtians, he appointed them, in the Koran, to turn themſelves, at prayer, towards the temple of Mecca: from which time they called thoſe two temples the *keblatan*, or two keblas.

Ricaut adds, that it is not the temple of Mecca, properly ſpeaking, that the Turks call kebla, but rather the large ſquare tower in the middle of the amphitheatre of that temple.

The kebla of the Jews was the temple at Jeruſalem; that of the Sabians, the meridian; and that of the Magians, the riſing ſun. To this the prophet Ezekiel refers chap. viii. 16.

Kebla is alſo uſed for an altar; or rather a *niche*, as Ricaut calls it, which the Mahometans have in all their moſques, and which is placed very exactly on that ſide towards the temple of Mecca.

Hence alſo kebla comes to be uſed, metaphorically, for the object, or end propoſed, in doing any thing.

Thus, the kebla of kings, is their crown and authority; that of men of buſineſs, is money; that of gluttons, good cheer, &c.

KEBLA-NOMA, or Kebleh-noma, a name which the Turks and Perſians give to a little pocket-compaſs, which they always carry with them, in order to place themſelves the more exactly when they go to prayers.

KEBLE, Joseph, in *Biography*, ſon of Richard Keble, eſq. a lawyer of reputation at Ipſwich, was born in London in 1632, and ſtudied at Jeſus and All-Souls colleges in Oxford. He was admitted a barriſter at Gray's Inn, and attended with the utmoſt aſſiduity at the king's bench for fifty years, though it is believed he never had a cauſe put into his hands, or was called to make a motion. He died ſuddenly in 1710, as he was ſtepping into a coach at Holborn-gate, being in his 78th year. His publications were numerous, and chiefly on legal ſubjects. He publiſhed, however, an eſſay on "Human Nature;" and another on "Human Actions." At his death, it is ſaid, his manuſcripts amounted to one hundred folios, and more than fifty quartos, all in his own hand-writing. Biog. Brit.

Keble's *Iſland*, in *Geography*, an iſland in the Mergui Archipelago, about five miles long, and 1½ broad. N. lat. 8° 59'.

KEBUCK Head, a cape on the E. coaſt of the iſland of Lewis. N. lat. 58° 2'. W. long. 6° 19'.

KECKERMAN, Bartholomew, in *Biography*, a Pruſſian divine, was born at Dantzic in the year 1571: here he received the elements of a learned education, and at the age of eighteen he was ſent to the univerſity of Wittemberg, and ſtudied philoſophy and divinity two years. From this ſeminary he went to the univerſity of Leipſic, where he ſpent ſome time, and then removed to Heidelberg. At this place he took his degrees, and at length became a tutor in ſeveral branches of knowledge. The fame which he acquired, as profeſſor of Hebrew, induced the ſenate of Dantzic, in the year 1597, to invite him to become co-rector of the celebrated academical inſtitution in that city, an office which he thought proper to decline. Four years afterwards the invitation was renewed, and he accepted it. The profeſſorſhip to which he devoted his talents was that of philoſophy, and he propoſed to lead ſtudents to its inmoſt receſſes by a more compendious method than had been before adopted. According to his plan, they were to complete their courſe of ſtudies in three years. In the execution of his method he drew up a great number of treatiſes on almoſt all ſubjects that could claim the attention of the young; but by ſtudying, writing, and teaching, he ruined his health, and fell a ſacrifice to his induſtry in the thirty-eighth year of his age. His works have been publiſhed in two volumes, folio.

KECKLE, on *Board a Ship*. When the cables gall in the hawſe, or the bolt-ropes do ſo againſt the ſhip's quarter, the ſeamen wind ſome ſmall ropes about them; and this is called *keckling*.

KEDAS, in *Geography*, a town of Bengal; 15 miles S.E. of Midnapour.—Alſo, a town of Syria, on the river Jermuk, anciently called *Gadara*; 56 miles N. of Jeruſalem.

KEDE', or Quade, a town of Africa, in the country of the Foulahs; 40 miles W. of Kayor.

KEDE-FARAH, a town of Aſiatic Turkey, in the government of Sivas, on the Kizilermack; 30 miles W. of Samſoun.

KEDGE, or Kidge. See Gedrosia and Macran.

KEDGER, or Kedge-*anchor*, in a *Ship*. See Anchor.

KEDGING, a ſea-term uſed when a veſſel is brought up or down a narrow river by the wind, though the tide be contrary to it.

To do this, the ſeamen ſet their fore-ſail, foretop-ſail, and mizen-ſail, and let her drive with the tide, that they may flat her about. If ſhe come too near the ſhore, they have a little anchor ready, called the *kedger*, or *kedge-anchor*, with a hawſer faſtened to it from the ſhip; and this they drop in the midſt of the current, by which means they wind her head about; and this done, take up the anchor again.

KEDGOORA, in *Geography*, a town of Hindooſtan, in Bundelcund; 30 miles N.N.E. of Callingar.

KEDGREE, a town of Hindooſtan; 34 miles N.E. of Benares.

KEDHAM, a town of Upper Guinea, ſituated on the river Scherbro; 200 miles from its mouth.

KEDOUS, a town of Aſiatic Turkey, in Natolia; 32 miles W. of Kintaja.

KEDRELÆON, Cedrelaion, in the *Materia Medica of the Ancients*, an oil taken from the *pix cedri*, or pitch of the cedar-tree.

KEDRON, in *Geography*. See Cedron.

KEEBLE, John, in *Biography*, an eminent organiſt and harpſichord-maſter, who, in 1737, on Roſeingrave being ſuperſeded at St. George's, Hanover-ſquare, on account of the derangement of his intellects, was appointed officiating organiſt of that church, upon half the ſalary, during the life of his predeceſſor. See Roseingrave.

Mr. Keeble was the firſt performer on the organ at the opening of Ranelagh, and at the ſubſcription concert eſtabliſhed by Hickford at his room in Brewer's-ſtreet. (See Hickford.) He had likewiſe, to the end of his life, the beſt range of teaching of any maſter in London; and was ſo ſure of pupils of rank and faſhion, in the immediate vicinity of his own reſidence, in Prince's-ſtreet, Hanover-ſquare, that he declined the attendance of any others.

This able and experienced maſter, beſides his practical abilities, had a paſſion for theoretical ſtudies, and ſpent his leiſure hours, during many years, in the inveſtigation of the muſic of the ancients, and the *Harmonica*, which ſee. He was ſuppoſed to die worth 30,000*l.* in 1786.

KEEFA, in *Geography*, a town of Africa, in Algiers; ſix miles N.E. of Tipſa.

KEEL, in *Botany*. See Carina.

Keel, the loweſt piece of timber in a ſhip, placed in the bottom of her hull; one end thereof being let into the ſtern-poſt, and the other into the ſtem.

If we compare the carcaſe of a ſhip to the ſkeleton of the human body, the keel may be conſidered as the back-bone, and the timbers as the ribs. It, therefore, ſupports and unites the whole fabric, ſince the ſtem and ſternpoſt, which are elevated on its ends, are, in ſome meaſure, a continuation of the keel, and ſerve to connect and incloſe the extremities of the ſides by tranſoms; as the keel forms and unites the bottom by timbers. The keel is generally compoſed of ſeveral thick pieces, placed lengthways, which, after being ſcarſed together, are bolted and clinched upon the upper ſide. When theſe pieces cannot be procured long enough to afford a ſufficient depth to the keel, there is a ſtrong thick piece of timber bolted to the bottom thereof, called the *falſe* keel.

When a ſhip has a deep keel, ſhe is ſaid to have a *rank* keel; and this ſerves to keep her from rolling.

Keel is alſo a name given to a low flat-bottomed veſſel, uſed in the river Tyne, to bring the coals down from Newcaſtle, and the adjacent parts, in order to load the colliers for tranſportation.

Keel, *upon an even*, in *Sea Language*, denotes the poſition of a ſhip when her keel is parallel to the plane of the horizon, ſo that ſhe is generally deep in the water at both ends.

Keel-*haling*, or *Keel-raking*, is a puniſhment inflicted at ſea, in the Dutch navy, on very great offenders, who are drawn underneath the very keel of the ſhip. See Ducking.

Keel-*rope*, a hair rope running between the keelſon and the keel of a ſhip, to clear the limber-holes when they are choaked up with ballaſt, &c.

KEELAGE, Killagium, a privilege to demand money for the bottoms of ſhips reſting in a port or harbour.

KEELERS, in the *Sea Language*, ſmall tubs to hold ſtuff to grave a ſhip's bottom.

KEELING, a name uſed in ſome Engliſh writers for the common cod-fiſh. See ASELLUS.

KEELSON is a keel withinſide ſimilar to that without, upon the floor timbers exactly over the keel of the ſame dimenſions, but always oak, keeping their butts or ſcarfs clear of each other: thus the bottom of the ſhip becomes firmly united by bolts driven through every floor timber, from the upper ſide of the keelſon to the under ſide of the keel.

KEEMA-KEDAN, in *Geography*, a cluſter of ſmall iſlands in the Eaſt Indian ſea, near the W. coaſt of the iſland of Leyta. N. lat. 10° 30′. E. long. 124° 36′.

KEEMO, in *Natural Hiſtory*, a large ſhell of the cockle-kind; probably, ſays Marſden (Hiſt. of Sumatra, p. 9.) the largeſt in the world. It is found in the bay of Tappanooly, in Sumatra, chiefly, and likewiſe in other parts of the Eaſt. Theſe ſhells are taken in deep water, by thruſting a long bamboo between the valves as they lie open, and by the immediate cloſure which follows they are made faſt. The largeſt, ſays Mr. Marſden, which I have ſeen, was about three to four feet over. The ſhell is perfectly white, and is worked up like ivory by the natives.

KEENDUEM, in *Geography*, a river which riſes in Thibet, and runs into the Irrawaddy, 40 miles below Ava. This great river comes from the N.W. and divides the country of Caſſay from that of Ava. It is navigable, as far as the Birman territory extends, for veſſels of burthen. The entrance of the Keenduem is about a mile wide.

KEENE, EDMUND, in *Biography*, an Engliſh prelate, was born at Lynn, in Norfolk, of which place his father was alderman. He was educated at Caius college, Cambridge, and, in 1740, obtained the rectory of Stanhope, in the biſhopric of Durham. In 1750, he was choſen maſter of St. Peter's college, and in a ſhort time after he ſerved the office of vice-chancellor, in which he promoted the regulations for improving the diſcipline of the univerſity. In 1752, he was made biſhop of Cheſter, where he continued eighteen years, when he was tranſlated to Ely. He died in the year 1781. He had a brother who was ſeveral years ambaſſador at the court of Madrid. Gen. Biog. Dict.

KEENE, in *Geography*, a poſt-town of America, in New Hampſhire, and one of the moſt flouriſhing in Cheſhire county; incorporated in 1753, and containing, in 1800, 1645 inhabitants. It is 86 miles N.W. from Boſton.

KEENEEBALOV, or ST. PETER'S MOUNT, a large mountain in the N. part of the iſland of Borneo, near which are a people called Oran, Idaen, and Maroots, who offer human ſacrifices to their deity. It is ſaid that they are acquainted with a ſubtle poiſon, in which they dip their ſmall darts, and thus cauſe a wound which produces inſtant death.

KEEP, *To*, in *Sea Language*, is a term uſed on various occaſions: as

To keep the land abroad, is, to keep within ſight of land as much as poſſible. See HOLD.

To keep the luff, is to continue cloſe to the wind, or to ſail with a courſe inclined to the direction of the wind as much as poſſible, without deviating to leeward. This is alſo called *keeping the wind*. See CLOSE-*hauled* and LOOF.

To keep off, is to ſail off, or keep at a diſtance from the ſhore. See OFFING.

KEEP, or *Dungeon*, the ſtrong tower of an ancient caſtle, commonly placed on a high natural or artificial mount, into which the garriſon retired when the caſtle itſelf was taken. The lake or cellar of ſuch keep was generally uſed to confine priſoners in.

KEEPER *of the Foreſt*, otherwiſe called *chief warden of the foreſt*, is an officer who has the principal government of all things belonging to a royal foreſt, and the check of all the other officers.

The lord chief juſtice in eyre of the foreſt, when he thinks fit to hold his juſtice ſeat, ſends out his general ſummons to the keeper forty days before, to warn all under-officers to appear before him, at a day aſſigned in the ſummons. See JUSTICE *of the foreſt*.

KEEPER *of the Great-ſeal*, is a lord by his office, and is ſtyled *lord keeper of the great-ſeal*. He is one of the king's privy-council, through whoſe hands paſs all charters, commiſſions, and grants of the king under the great-ſeal; without which ſeal, all ſuch inſtruments, by law, are of no force: for the king is, in the interpretation of the law, a corporation, and paſſes nothing firmly but under the ſaid ſeal; which is, as the public faith of the kingdom, in the higheſt eſteem and reputation.

The lord keeper has the ſame place, authority, pre-eminence, juriſdiction, execution of laws, and all other cuſtoms, commodities, and advantages, as the lord chancellor of England has for the time being. Both theſe officers cannot properly ſubſiſt at the ſame time, ſince the ſtatute of 5 Eliz. The lord chancellor, or lord keeper, is ſuperior in point of precedency to every temporal lord.

KEEPER *of the Privy-ſeal*, is a lord by his office; through whoſe hands paſs all charters ſigned by the king, before they come to the great ſeal, and ſome things which do not paſs the great-ſeal at all. He is of the king's privy council, and was anciently called *clerk of the privy-ſeal*; yet reckoned in the number of the great officers of the realm. 12 Ric. II. c. 11. 27 Hen. VIII. c. 11.

KEEPER, *Boat*, in *Sea Language*, one of the rowers, who remains as a centinel in his turn, to take care of any boat and her contents, either when ſhe lies by the ſhore, or alongſide of the ſhip; or when ſhe is towed a-ſtern of her.

KEEPER, *The*, in *Geography*, a high mountain in the county of Tipperary, province of Munſter, Ireland, which forms a conſpicuous object to a great extent of country. It is ſeven miles S.S.W. from Nenegh.

KEEPING, in *Painting*, is a technical term, which ſignifies the peculiar management of thoſe parts of the art, colouring and chiaro-ſcuro, which produces the proper degree of relievo in objects admitted into a compoſition; according to their relative poſitions in the imagined ſcene, and the degree of importance the artiſt attaches to them.

When he has choſen his ſubject, and arranged his figures, forms, and colours, his next taſk will be, to give each object its local ſituation, and to bring thoſe forward in the picture which he intends ſhould be moſt impreſſive on the beholder; or at leaſt, ſo to manage the ſurrounding ones, that thoſe which are principal in the ſubject and compoſition, ſhould not fail of their effect. This may be effected either by ſhade or colour: either by throwing a ſhadow acroſs the inferior objects, or teinting them with a colour leſs bright than that given to the others; and even, in very ſkilful hands, it may be done by the very reverſe mode of practice to either of the above: but that is extremely difficult, and requires the knowledge and the hand of a great maſter in the art to execute it.

As the objects recede in the ground-plane of the picture, the hue of the atmoſphere intermixing with their proper, or local colour, as it is termed, (though improperly ſo,) will aſſiſt in their keeping; *i. e.* will cauſe them to appear at their juſt diſtance from the front figures. Therefore there is leſs art required here, than in ſeparating and rounding figures ſituated nearly in the ſame plane, and combining together in maſſes, wherein the great difficulty of keeping lies.

It will be ſeen by what has been ſaid, that keeping is but another word for *effect* in its more confined ſenſe, as it relates to the individual objects of a picture; it is, however, a component part of *effect* in its general and moſt extenſive meaning; of which it forms the baſis in conjunction with arrangement of forms and colours; which latter includes, in the painter's eye, lights and ſhades. See Effect, in *Painting*.

On keeping, relievo entirely depends; for if the lights, ſhadows, and half-teints be not kept in their exact relative proportions of depths, no rotundity can be effected; and without due oppoſition of light, ſhade and colours, no apparent ſeparation of objects can take place.

Whatever kind of effect is intended, keeping muſt be called into action; ſince each object muſt have its own apparent, proper, and local projection; and no leſs its relative ſtrength in regard to the general impreſſion which the ſubject is calculated to produce.

So much has been ſaid that applies to this article under the word Effect, that we forbear to enlarge further upon it, than juſt to ſtate, that the Flemiſh ſchool may be moſt advantageouſly ſtudied with regard to it, in what relates to hiſtory, portraiture, and ſtill life: and in landſcape, we would add to Ruyſdale and Hobbima, the more valuable name of Claude, as the painter who has produced the moſt exquiſite productions in art for the quality we are now diſcuſſing.

KEEPITHEJA, in *Botany*, the name by which ſome authors call the trees, on the branches of which the gum lacca of the ſhops is uſually found.

KEERA, in *Geography*, a town of Hindooſtan, in Boggilcund; 12 miles E. of Kewah.

KEERETPOUR, a town of Hindooſtan, in the circar of Sumbul; 10 miles S.S.W. of Nidjibabad.

KEERPOU, a town of Hindooſtan, in Bengal; 33 miles S.S.W. of Burdwan. N. lat. 22° 45'. E. long. 87° 35'.

KEERYSHUR, a town of Hindooſtan, in the Carnatic; 22 miles S.S.W. of Bomrauzepollam.

KEESERA, a town of Hindooſtan, in the circar of Condapilly; 16 miles N.W. of Condapilly.

KEEVE, in *Rural Economy*, a provincial term uſed to ſignify a vat in which beer is worked or fermented.

Keeve is alſo a veſſel uſed in dreſſing tin-ores. See Tin.

KEFF, or Kefts, in *Geography*, a town of Africa, in the kingdom of Tunis, reckoned the third for riches and ſtrength in the country: anciently called "Sicca," or "Sicca Veneria." In the 18th century the citadel was blown up, and afterwards rebuilt with additional ſtrength and beauty. In levelling an adjacent mount on this occaſion an entire ſtatue of Venus was dug up, which was inſtantly broken to pieces by the Moors. At the ſame time was dug up an equeſtrian ſtatue, dedicated to Marcus Antoninus Rafus, which ſuffered the ſame fate. Keff, as its name imports, is ſituated upon the declivity of a hill, with a plentiful ſource of water near the centre of it; 70 miles W.S.W. of Tunis. N. lat. 36° 15'. E. long. 9° 3'.

KEFFEKIL, in *Mineralogy*, a ſtone of a white or yellow colour, ſoapy feel, and moderate hardneſs, which increaſes in the fire. It is the ſubſtance of which the large Turkey pipes are made. It is found in Krim Tartary, in Canada, in Flanders, and in other places. The Tartars uſe it inſtead of ſoap, and it is ſo uſed in Auſtrian Flanders. Wiegleb found it to conſiſt of equal parts of magneſia and ſilex, whence it ſeems to operate as a fuller's earth. See Meerschaum.

KEFFING, in *Geography*, a ſmall iſland in the Eaſt Indian ſea, near the S.E. coaſt of the iſland of Ceram. S. lat. 3° 28'. E. long. 131° 11'.

KEFIL, a village of the Arabian Irak, famous for the tomb of the prophet Ezekiel, annually viſited by a multitude of Jews; 14 miles S. of Helleh.

KEFKEBEH, a town of Natolia; 20 miles N.E. of Eſkiſhehr.

KEFKEN, a ſmall iſland in the Black ſea, near the coaſt of Natolia. N lat. 41° 6'. E. long. 30° 40'.

KEFREEN, a town of Syria, on a large plain to which it gives name, diſtinguiſhed for the number of pigeons that are bred there; 15 miles from Aleppo.

KEFT, or Kepht. See Coptos.

KEHEEP, a town of Hindooſtan, in Lahore; 45 miles S. of Attock.

KEHEMEND, a town of Perſia, in the province of Farſiſtan; 35 miles N. of Eſtakar.

KEHL, a fortreſs in the duchy of Baden. At the peace of Ryſwick in 1697, this fort was ceded to the emperor and empreſs, and declared an imperial fortreſs. In the war between France and Auſtria, it was often taken and retaken; 2 miles E. of Straſburg. Kehl was united to the French empire by a decree of the Conſervatory Senate in January 1808, and made a part of the department of the Lower Rhine.

KEHOA, a town of Aſia, in Tonquin, near the coaſt. N. lat. 19° 12'. E. long. 105° 21'.

KEHRICZ, a town of Perſia, in Khoraſan; 70 miles N. of Herat.

KEIA-REGIAN, a town of Perſia, in Irak; 60 miles W.N.W. of Hamadan.

KEIFLINGE, a town of Sweden, in the province of Schonen; 6 miles N.E. of Lund.

KEI-GAM, a town of Corea; 30 miles S.E. of Coufou.

KEIGHLEY, a town of England, in the county of York, ſituated on a navigable canal, and having a market on Wedneſday. In 1801, the population conſiſted of 5745 perſons, of whom 5456 were employed in trade and manufacture; 12 miles N. of Halifax, and 209 N.N.W. of London.

KEIKEM, in the *Materia Medica*, a name given by the Arabian writers to a gum uſed in their time for making of varniſh.

Gum lacca is generally ſaid to be the ſubſtance meant by it, but Avicenna ſeems to expreſs by it every thing that was uſed as varniſh. Thus he ſometimes means by it the gum ſandarach, and ſometimes amber. The gum cancamum of the Greeks is alſo certainly often meant by it; but this is ſcarce to be mentioned as an application of the word, it being almoſt as general a term as itſelf, and ſtanding with many of the old authors for ſandarach, gum lac, and amber, as well as for the gum properly expreſſed by it. In ſhort, all the gums uſed in making varniſh, are in general called by the names of any one of them, and thus vernix, ſandarach, cancamum, and lacca, are made ſynonymous words, and either ſtands for each of the things ſignified by all the words.

KEIKIS, in *Geography*, a town of Sweden, in the government of Abo; 48 miles N. of Biorneborg.

KEILAH. See Cila.

KEILL, John, in *Biography*, a celebrated mathematician and philoſopher, was born at Edinburgh in the year 1671; here alſo he received his early education, and at the univerſity purſued his maturer ſtudies, and took his degree of M.A. He was particularly attached to Dr. Gregory, who taught the mathematics, and read a courſe of lectures on the Newtonian philoſophy. Under him and by his aid he was enabled to make himſelf maſter of the "Principia," which he regarded as the ground-work of his future ſtudies. In the year 1694, Mr. Keill went with his tutor to Oxford, entered himſelf of Baliol college, and read lectures himſelf in his own chambers upon natural and experimental philoſophy, by which he acquired conſiderable reputation. As an author, he firſt appeared with an "Examination of Dr. Burnet's Theory of the Earth," which led to a more extended controverſy on the ſubject: in this he diſplayed very commanding talents, and ably refuted the ingenious theories of Dr. Burnet and Mr. Whiſton. He readily admitted that though the work, the errors of which he undertook to expoſe, was full of miſtakes in philoſophy, yet none ever abounded with more beautiful ſcenes and ſurpriſing images of nature. In 1700, he ſucceeded Dr. Millington, who was appointed phyſician in ordinary to the king, as Sedleian profeſſor of natural philoſophy, and read lectures in the public ſchools. He now removed to Chriſt-church college, and, in 1702, he publiſhed his treatiſe, intitled "Introductio ad veram Phyſicam," containing the ſubſtance of ſeveral lectures on the new philoſophy. This work met with a favourable reception in his own and in foreign countries, and was conſidered as a good introduction to the Principia. In 1736, a new edition of it was printed in London at the wiſh of M. Maupertuis, who ſubjoined to it a new hypotheſis of his own concerning the ring of the planet Saturn. In 1708, Mr. Keill was elected a member of the Royal Society, of which he proved himſelf a very uſeful member, and enriched the Tranſactions of the Society with many valuable papers. In the following year he made a voyage to New England, as treaſurer of the Palatines who were ſent by government into that country, and ſoon after his return, in the following year, he was choſen Savilian profeſſor of aſtronomy. Mr. Keill next engaged in the controverſy reſpecting ſir Iſaac Newton's claim to the invention of fluxions: ſeveral letters paſſed on the ſubject between M. Leibnitz and our author; till at length a ſpecial committee of the Royal Society was appointed to examine the merits of the caſe, which committee concluded their report with declaring, that they reckoned ſir I. Newton the firſt inventor of the method in queſtion, and that they were alſo of opinion that Mr. Keill, in aſſerting the ſame, had been no ways injurious to M. Leibnitz. The particulars of theſe proceedings may be found in a work to which we have, in this Cyclopedia, already more than once referred; *viz.* the "Commercium-Epiſtolicum" of Mr. Collins. The diſpute was carried on for ſome years in the "Acta Eruditorum," and the "Journal Litteraire." It was generally admitted that Mr. Keill conducted himſelf in theſe conteſts with a great degree of firmneſs and ſpirit, and that he ſatiſfactorily repelled the attacks upon the reputation of our illuſtrious countryman. In 1711, he publiſhed a paper in the Philoſophical Tranſactions, "On the Rarity of Matter, &c." in which he points out various phenomena which cannot be explained upon the ſuppoſition of a plenum. About this time queen Anne was pleaſed to appoint him to the office of decypherer to her majeſty, in which he continued till the year 1716. In 1713, the univerſity of Oxford conferred upon him the diploma of doctor of medicine, and two years afterwards he publiſhed an edition of Euclid, to which he added two tracts on Trigonometry and the Nature of Logarithms. In the year 1718, Dr. Keill publiſhed at Oxford his "Introductio ad veram Aſtronomiam," which was afterwards tranſlated by himſelf into Engliſh, at the requeſt of the ducheſs of Chandos, under the title of "An Introduction to the true Aſtronomy," &c. The author did not long ſurvive this work. He died of a fever in the ſummer of 1721, being only in the 50th year of his age.

KEILL, JAMES, an eminent phyſician, was born in Scotland on the 27th of March 1673. Having received the early part of his education in his native country, he went abroad with the view of completing it in the ſchools of celebrity on the continent; and obtained ſuch a degree of knowledge as diſtinguiſhed him ſoon after his return to England. He had early applied to diſſections, and purſued the ſtudy of anatomy, under Duverney, at Paris; whence he was enabled to give anatomical lectures, with great reputation, in both the Engliſh univerſities. He was honoured with the degree of M.D. by the univerſity of Cambridge. In 1703 he ſettled at Northampton, and began the practice of his profeſſion, in which he attained conſiderable fame and ſucceſs. In 1706 he publiſhed a paper in the Philoſophical Tranſactions, N° 306, containing "an account of the death and diſſection of John Bayles, of that town, reputed to have been 130 years old." The circumſtances which he detailed very much reſembled thoſe that were obſerved by the celebrated Harvey in the diſſection of old Parr. Dr. Keill, like his brother John, was well ſkilled in mathematical learning, which he applied to the explanation of the laws of the animal economy. His firſt publication was a compendium of anatomy, for the uſe of the pupils who attended his lectures, and was entitled, "The Anatomy of the Human Body abridged," 12mo. Lond. 1698, and was taken chiefly from Cowper: it went through many editions. In the year 1708, he gave the world a proof of his mathematical ſkill, in "An Account of Animal Secretion, the Quantity of Blood in the Human Body, and Muſcular Motion," Lond. 8vo. This work was reprinted in 1717, with the addition of an eſſay, "concerning the Force of the Heart in driving the Blood through the whole Body," and under the title of "Eſſays on ſeveral Parts of the Animal Œconomy." He likewiſe publiſhed the ſame treatiſe in Latin, with the addition of a "Medicina Statica Britannica." The eſſay concerning the force of the heart drew him into a controverſy with Dr. Jurin, which was carried on in ſeveral papers, printed in the Philoſophical Tranſactions of the Royal Society, of which Dr. Keill had been elected a member; and was continued to the time of the death of the latter, which took place at Northampton, on the 16th of July 1619, in the vigour of his age. He had for ſome time laboured under a very painful diſorder, *viz.* a cancer in the roof of his mouth, to which he had applied the cautery with his own hands, in order, if poſſible, to procure ſome relief, but in vain. Eloy. Dict. Hiſt. Hutchinſon's Biog. Med.

KEILLESAY, in *Geography*, one of the ſmaller Weſtern iſlands of Scotland; 3 miles N.E. of Barray iſland. N. lat. 57° 2'. W. long. 7° 23'.

KEIM-HOTUN, a town of Chineſe Tartary, in the government of Kirin. N. lat. 44° 45'. E. long. 129° 24'.

KEIRAN, in the *Oriental Learning*, the Perſian and Arabic name for the planet Saturn, according to Salmaſius. See CHIUN.

KEIRLEBERUS, JOHN GEORGE, in *Biography*, born at Würtemberg, was at once a philoſopher, poet, and muſician. In 1691, he compoſed for the birth-day of the emperor Joſeph I. a Latin poem, which he ſet to muſic in a perpetual canon of 16 vocal parts, and 16 violin accompaniments, in a different melody; a piece of pedantry much admired by profeſſors and deep dilettanti at the latter end of the 17th century. He afterwards compoſed another perpetual canon in eight parts, four viol da gambas, two counter-tenors, and two tenors, with ſeveral other various and complicated contrivances, as myſtical, and as much reſpected at the time as the oracles delivered by the Pythia.

KEIS Bay, or *Sinclair's Bay*, in *Geography*, a bay on the E. coaſt of Scotland, in the county of Caithneſs. N. lat. 58° 28′. W. long. 2° 58′.

KEISER, Reinhard, in *Biography*, a German compoſer of the firſt claſs, for invention, ingenuity of accompaniments, and number of his works. This admirable muſician was born in 1673, at Weiſſenfels in Saxony, and, very early in his profeſſional career, appointed maeſtro di cappella to the duke of Mecklenburg. Though his firſt attempt at dramatic muſic was a paſtoral, called "Iſmena," for Wolfenbuttle, which he ſet in his 20th year, the year following he compoſed his opera of "Baſilius," which was performed in the theatre at Hamburgh with very great applauſe; and he continued writing for that ſtage till the year 1739.

He was educated at Leipſic, where he was entered of that univerſity. He began to ſtudy muſic in that city, but was chiefly his own maſter, forming himſelf upon the Italian ſchool, by ſtudying the beſt productions of that country. His ſecond opera for Hamburgh, "Adonis," eſtabliſhed him in the favour of that city for the reſt of his life. According to Mattheſon, whatever words he ſet on the ſubject of love, his muſic was peculiarly excellent. His operas, in Hamburgh alone, amounted to 118. But beſides his dramatic productions, he compoſed *divertimenti*, *ſerenate*, and *cantatas* innumerable. Indeed, this maſter was as ſure of fancy and originality whenever he put pen to paper, as Haydn in his time. In a manuſcript collection of near ſeventy cantatas by the greateſt compoſers of his time, both of Italy and Germany, in which there are twelve by Keiſer, in opening the book by chance, in any part of it where his cantatas are inſerted, it is inſtantly known to be his muſic, at the firſt glance; ſo new are the paſſages, and ſo different the arrangement of the notes from that of his companions in this collection, amounting to near thirty of the firſt order. For grace and facility we do not recommend him: indeed, theſe excellencies were little known or ſought during his time; but for modulation, ingenuity, and new ideas, he had ſcarcely his equal.

In a converſation with the elegant and judicious Haſſe at Vienna in 1772, he aſſured us that, according to his conceptions, Keiſer was one of the greateſt muſicians the world ever ſaw. His compoſitions, he ſaid, were more voluminous than thoſe of Aleſſandro Scarlatti; and his melodies, though then 70 years old, were ſtill, he thought, modern and graceful. Adding, that this had been always his opinion; and he was not likely to be prejudiced in his favour, as Keiſer was not his relation, his maſter, or even his acquaintance; but having lately looked at ſome of his works, he was aſtoniſhed to ſee ſo much more elegance, clearneſs, and pleaſing melody than are to be found in the productions of moſt modern maſters, even now. "He compoſed, indeed, chiefly for Hamburgh," Signior Haſſe obſerved, "and, in general, to the German language, not being very well verſed in that of Italy; ſo that he often blundered in ſetting Italian words; but he had always merit of other kinds to compenſate for this defect."

At this time all our own knowledge of this compoſer was traditional, as we were then totally unacquainted with his works; but we can now ſpeak from demonſtration, and our own examination of his works of various kinds, which manifeſt all the vigour of a fertile invention, and correctneſs of ſtudy and experience.

Keiser's *River*, in *Geography*, a river of Africa, at the Cape of Good Hope, which deſcends from Table mountain.

KEISKAMMA, a river of Africa, which runs into the Indian ſea, S. lat. 32° 44′.

KEITH, James, in *Biography*, a diſtinguiſhed general, younger ſon of George Keith, earl marſhal of Scotland, by a daughter of Drummond, duke of Perth, was born in 1696, and educated at the college of Aberdeen. He was an adherent to the Stuart family, and engaged in their defence in the year 1715; but on the defeat of his party he was glad to eſcape to France, where he applied to all the branches of knowledge uſeful in the military profeſſion. He was admitted a member of the Academy of Sciences on account of his great proficiency in mathematics. He travelled through many countries in Europe, ſerved 10 years in the Iriſh brigades in Spain, and afterwards entered into the Ruſſian ſervice, in which he was raiſed to the rank of brigadier-general. In the war between the Ruſſians and the Turks he gave the moſt ſignal diſplays of courage and heroiſm, and was himſelf the firſt to mount the breach at the capture of Otchakof. He had a ſhare in the war in Finland, between the Swedes and Ruſſians, and was inſtrumental in placing the princeſs Elizabeth on the throne of Ruſſia. At the peace of Abo in 1743, he was ſent ambaſſador to the court of Stockholm, and on his return to Peterſburgh he was honoured with the marſhal's ſtaff; but as the emoluments of this office were inſufficient for his ſupport, he accepted an invitation from Frederick king of Pruſſia, by whom he was honoured with conſiderable appointments, and with his own perſonal friendſhip. In the war of 1756 he entered Saxony in the quality of field-marſhal; and in 1758 he was killed, at the ſurpriſe of the camp of Hochkirchen, by count Daun. He was reckoned a very able general, and was highly eſtimable in his private character. The king of Pruſſia honoured his memory with a fine monument at Potzdam.

Keith, in *Geography*, a pariſh in the county of Banff, Scotland, contains four hamlets or villages: 1ſt, the old town of Keith; 2d, the new town of Keith; 3d, the new town of New-Mill; and, 4th, the old town of New-Mill. The old town is nearly deſerted by the inhabitants in conſequence of the ſuperior advantages of the new town. This was commenced in the year 1750, by the earl of Findlater, upon a barren moor, which was let in lots of 30 feet by 70. Here ſeveral manufacturers eſtabliſhed themſelves, and the place gradually increaſed in houſes and population. In 1791 there were 1075 of the latter; and in 1800 the whole pariſh contained 749 houſes, and 3284 inhabitants. Theſe are compriſed within an area of about ſix miles in length, by ſix in breadth. Flax-dreſſing, ſpinning, and weaving, are the chief branches of manufacture: a tannery, diſtillery, and bleaching-field, are included within the pariſh. The pariſh-ſchool of Keith has been long noted for its able maſters. Near old Keith, the river Iſla, falling over ſome high rocks, forms a fine caſcade, called the "Linn of Keith." James Ferguſon, juſtly celebrated for his aſtronomical and philoſophical writings, was a native of this pariſh. Within the precincts of the pariſh are ſome druidical remains. Sinclair's Statiſtical Account, vol. v. article written by the Rev. Alexander Humphrey.

KEKI, a town of Japan, in the iſland of Ximo; 15 miles N.N.W. of Naka.

KEKIO. See Fern-*Oil*.

KEKO, in *Geography*, a town of Hungary, with a caſtle; 15 miles S.E. of Korpona.

KELA, or Quilla, a town of Africa, on the Slave coaſt, in the canton of Koto.

KELAIA, a town of Arabia, in the province of Hedsjas; 50 miles E.S.E. of Calaat el Moilah.

KELANG, or Kilang, a ſmall iſland in the Eaſt Indian ſea, near the W. coaſt of the iſland of Ceram. S. lat. 3° 8'. E. long. 128°.

KELAR, a town of Perſia, in Irak; 70 miles E.S.E. of Caſbin.

KELAT, a town of Perſia, in the province of Khoraſan, at the edge of a mountain ſurrounded by rocks: it was taken by Timur Bec in 1382; 12 miles E. from Abiverd.

KELES, a town of Aſiatic Turkey, in Natolia; 28 miles E.N.E. of Epheſus.

KELHEIM, a town of Bavaria, ſituated on an iſland formed at the conflux of the Altmuhl and Danube; 46 miles N.N.E. of Munich. N. lat. 48° 52'. E. long. 11° 52'.

KELIUB, or Kaljub, a town of Egypt, on the Kalit's Abu Meneggi, the capital of a diſtrict; 6 miles N. of Cairo.

KELL, in *Rural Economy*, a web, or kind of bag, in which inſects are bred.

KELLAH, in *Geography*, a town of Abyſſinia; 75 miles E. of Axum.

KELLER, John Balthasar, in *Biography*, a celebrated artiſt, was born at Zurich in 1638. Having learnt the art of a goldſmith, in which he diſplayed great ingenuity, he went to Paris by the invitation of his brother, who held the poſts of canon-founder, and commiſſary of artillery to the king of France. While in the French ſervice he caſt a great many cannon, together with ſeveral ſtatues for the gardens of Verſailles; but that by which he is chiefly celebrated is the grand equeſtrian ſtatue of Lewis XIV. executed after the model of Girardon. He was made inſpector of the foundery at the arſenal, and died at Paris in the year 1702. Gen. Biog.

Keller, Godfrey, a native of Germany, who ſettled in England about the beginning of the laſt century, and had much practice as a harpſichord maſter. In 1711, he publiſhed, at Amſterdam, ſix ſonatas, engraved on copperplates; of which the three firſt were for two violins, a tenor, a trumpet or hautbois, and a baſs; the three laſt for two flutes, two hautbois or violins, and a baſſo continuo. Theſe the author dedicated to queen Anne. After this he and Finger publiſhed ſonatas, jointly, in five parts.

As a compoſer, Keller was ſoon forgotten; but he was remembered a conſiderable time as the author of a poſthumous treatiſe on *thorough-baſe*, which he had finiſhed, but did not live to publiſh. It was, however, printed, a ſhort time after, by Cullen at the Buck, between the Temple gates and Fleet-ſtreet, with the following ample title: "A complete Method for the attaining to play a Thorough-Baſe upon either Organ, Harpſichord, or Theorbo-Lute; by the late famous Mr. Godfrey Keller, with Variety of proper Leſſons and Fugues, explaining the ſeveral Rules throughout the whole Work; and a Scale for tuning the Harpſichord or Spinet, all taken from his own Copies, which he did deſign to print."

This treatiſe, though meagre, was the beſt our country could boaſt, till Lampe, in 1737, publiſhed his "Plain and Compendious Method of teaching Thorough-Baſe, after a moſt rational Manner, with proper Rules for practice; the Examples and Leſſons curiouſly engraved on Copperplates." Of this work we ſhall ſpeak hereafter. See Lampe.

KELLERAMPT, in *Geography*, a bailiwick of Switzerland; in the canton of Zurich, of which Bremgarten is the principal place.

KELLEY, Edward, in *Biography*, the aſſociate of Mr. Dee (to whoſe article the reader is referred), in his incantations, was born at Worceſter in the year 1555. He was educated in grammar learning in his native city, and at the age of ſeventeen he was ſent to the univerſity of Oxford. According to Anthony Wood he left Oxford very abruptly, and in his peregrinations behaved ſo ill, and committed ſo many foul matters, that at Lancaſter he was for ſome offence deprived of his ears. After this he became acquainted with Mr. Dee, and, as we have ſeen, they ſet out for the continent. For ſome time Kelley lived in a very expenſive ſtyle, ſupported, probably, by the contributions which he levied on the credulous, till he was ordered into confinement by the emperor Rodolph. He obtained his releaſe, and conciliated the favour of the prince, who conferred on him the honour of knighthood. Freſh diſcoveries of his knavery occaſioned a ſecond impriſonment, and in attempting to eſcape from the place of his confinement, he met with an accident which put an end to his life in the year 1595. He was author of ſeveral works, of which "A Poem on Chemiſtry," and another on "The Philoſopher's Stone," were inſerted in Aſhmole's "Theatrum Chymicum Britannicum." He publiſhed at Hamburgh, in 1676, a treatiſe, "De Lapide Philoſophorum:" he was author, likewiſe, of "A True and faithful Relation of what paſſed, for many Years, between Dr. John Dee and ſome Spirits, &c." Several of his MSS. are ſtill preſerved in the Aſhmolean Muſeum, at Oxford. Wood's Athen.

Kelley, Hugh, a dramatic writer, was a native of Ireland, and bred a ſtay-maker, which profeſſion he quitted when he came to London, and became writer to an attorney. He afterwards obtained a livelihood by his pen, and was author of the following pieces: "Falſe Delicacy;" "A Word for the Wiſe;" "The School for Wives;" "The Romance of an Hour." Theſe, as their titles denote, are all comedies. He was author alſo of "Clementina," a tragedy; "Theſpis," a poem; "Memoirs of a Magdalen;" "The Babbler;" and a collection of Eſſays. He died in the year 1777.

KELLI, in *Geography*, a town and fortreſs of Hindooſtan, in the country of Tanjore; 27 miles S. of Tanjore. N. lat. 10° 20'. E. long. 79° 7'.

KELLINORE, a town of Hindooſtan, in the Carnatic; 10 miles N. of Pondicherry.

KELLS, a market and poſt-town of the county of Meath, province of Leinſter, Ireland. It was in former times a city of note, and on the arrival of the Engliſh was walled and fortified with towers: a caſtle was built in 1178, and there were ſeveral religious houſes. It was alſo a borough town, which, before the Union, ſent two burgeſſes to parliament. Kells is 32 miles N.W. from Dublin on the river Blackwater, and nearly eight from Navan.

KELLY, Earl of, in *Biography*, an illuſtrious dilettante muſician, in whom were united application, genius, and a powerful hand on the violin. This nobleman went through all the gradations of ſtudy neceſſary to form a profound contrapuntiſt. When he quitted Great Britain to make the tour of Germany, according to Pinto, he could ſcarcely tune his violin; but ſtopping at Manheim, he heard the beſt inſtrumental muſic in Europe, and ſhut himſelf up with the elder Stamitz, whoſe originality and fire ſet his young pupil in a blaze, and ſo congenial were the taſte and diſpoſition of the ſcholar and the maſter, that they ſeemed the growth of the ſame ſoil. The ſame energy and enthuſiaſm which had lifted Stamitz above his fellows of the Manheim ſchool, ſtimulated the young earl to ſtudy compoſition, and practiſe the violin with ſuch ſerious application, that, on his return to England, there was no part of theoretical or practical muſic in which he was not equally verſed with the greateſt profeſſors of his time. Indeed, he had a ſtrength of hand on the violin, and a genius for compoſition, with which few profeſſors are gifted. His ear was ſo correct, and his perception ſo acute, that in the midſt of a turbulent and tumultuous movement of a ſymphony in twelve or fourteen parts, if any inſtrument failed either in time or tune, though playing a different and difficult part himſelf, he inſtantly prompted the erroneous performer with his voice, by ſinging his part without abandoning his own.

KELLYSBURG, in *Geography*, a townſhip of America, in Chittenden county, Vermont, at the head of the north branch of La Moille river.

KELMEE, a town of Hindooſtan, in the Baglana country, on the coaſt; 16 miles N. of Baſſeen.

KELMEBEK, a town of Natolia; 28 miles E. of Pergamo.

KELMO, a town of Sweden, in Eaſt Gothland; 23 miles N. of Linkioping.

KELNAR, a town of Caramania, near the coaſt of the Mediterranean; 12 miles W. of Selefkeh.

KELNER, in *Biography*, a German muſician, who came into England early in the laſt century, and performed on the double-baſe in the theatres and concerts of the time. Having attached himſelf to Dr. Pepuſch, his venerable countryman, it was found, at the doctor's deceaſe, that the moſt curious books and MSS. of his valuable library at the Charter-houſe, were bequeathed to Kelner and Travers, another of the doctor's conſtant attendants, who both dying ſoon after their bequeſt was known, that, and the remainder of the moſt curious and ineſtimable muſical library perhaps in Europe, were ſold piece-meal, diſpoſed of and embezzled, in a manner difficult to deſcribe or underſtand. See Pepusch, and *Muſical* Library.

KELP, in *Agriculture* a term applied to the mineral alkali in its more impure ſtate; the kelp of commerce contains the aſhes of the plant that affords it, and is found to be a good manure. See Carbonat *of* Soda.

KELSAL'S Island, in *Geography*, a ſmall iſland in the Mergui Archipelago, ſeparated from the S.E. extremity of the iſland of St. Suſanna, by Alderſey's ſtraits. N. lat. 10° 27'.

KELSO, a town in the county of Roxburgh, Scotland, is built on a ſpot where the rivers Tevid and Tweed unite their ſtreams, and is nearly ſurrounded with eminences covered with trees. Hence the ſcenery is particularly picturesque and pleaſing. The houſes are arranged round a large ſquare, and on the ſides of ſix ſtreets, which diverge from the ſquare in nearly a regular and uniform manner. The town-houſe, with ſhops and ſome of the principal dwellings, are in the ſquare. In the town are the pariſh-church and an epiſcopal chapel, which are deſcribed as handſome ſtructures. Among the public buildings are a diſpenſary, a public ſubſcription library, and a modern bridge over the Tweed, erected in the place of a former one, ſwept away by a flood in 1798. A church was founded here in 1138; and a monaſtery was transferred from Selkirk to this place by David I., who "conferred on the monks this village, with its lands and waters, free from all exaction." David II. granted to the abbot a free-market here. "The town of Kelſo ſhared the fate of the abbey during the hoſtile conflicts between the kindred nations in being often plundered and ſometimes fired." In the years 1522, 1542, and 1544, it was greatly damaged from the border warriors. The town was almoſt deſtroyed in 1686 by an accidental fire, and about the middle of the laſt century, it ſuſtained great damage from the ſame cauſe.

David II. conſtituted the town of Kelſo, with the barony of Bolden, and other lands, a free regality. This was converted, in 1607, into a lordſhip in favour of Robert Kerr, earl of Roxburgh. The duke of Roxburgh is proprietor of the lands here. The principal trade of Kelſo is the manufacture of woollen cloth, and dreſſing of ſheep and lambs' ſkins, of which it is ſuppoſed that from 70,000 to 80,000 are annually exported. Great numbers of boots and ſhoes are annually made here. This place is much reſorted to by gentlemen who attend the "Caledonian hunt," and by others on account of the races. The abbey buildings of Kelſo have been very extenſive and grand. At preſent its ruined church preſents many intereſting fragments of Norman architecture. Mr. Pennant remarks, that the "environs of Kelſo are very fine, and the inhabitants have much reaſon to boaſt of their proſpects." In the vicinity of the town are ſeveral ſeats of the nobility and gentry: Fleurs, "the magnificent ſeat" of the duke of Roxburgh; Springwood-park, the reſidence of ſir George Douglas, bart.; Softlaw-tower, Mr. Proctor's; Roſe-bank, captain Scott's; Pinnacle-hill, Mr. Davidſon's; Wooden, Mr. Walker's; &c. In 1800, Kelſo contained 527 houſes, and 4196 inhabitants. Chalmers's Caledonia, vol. ii. Sinclair's Statiſtical Account, vol. x. p. 576. Pennant's Tour to Scotland.

KELTAN, a town of Thibet; 40 miles E.N.E. of Laſſa.

KELTANPUSUACLIAN, a town of Thibet; 52 miles W. of Sgigatche.

KELTSCH, a town of Moravia, in the circle of Prerau; 14 miles E. of Prerau.

KELVAN, a town of Perſia, in Farſiſtan; 18 miles E.N.E. of Schiras.

KELVEH, a town of Perſia, in the province of Mecran, on the Nehenk; 280 miles S.E. of Zareng. N. lat. 28° 50'. E. long. 65° 48'.

KELVIN, a river of Ireland, in the county of Londonderry, which runs into the Roe, about 4½ miles S. from Newtown Limavaddy.

KELVIO, a town of Sweden, in the province of Ulea; nine miles E.N.E. of Gamla Karleby.

KELWAY, Joseph, in *Biography*, the beſt extemporaneous performer on the organ, and neateſt harpſichord player among the natives of our own country, during the middle of the laſt century. He had been, early in his life, apprenticed to a dancing-maſter at Bath; but having attempted the harpſichord, and received a few leſſons from old Chilcot, he had made ſuch a progreſs on that inſtrument, that Geminiani, happening to hear him, diſcovered a hand and diſpoſition ſo promiſing, that he not only encouraged him to ſtudy muſic as a profeſſion, but gave him inſtructions. And his ſtyle of playing ever after more reſembled the compoſitions of Geminiani than thoſe of Handel, which all other organiſts ſervilely copied. The broken phraſes and rhapſodical flights of Geminiani often ſeem more like voluntary playing than regular compoſition. Stanley's voluntaries were ſo ſmooth and well-phraſed, that they ſeemed pieces played by memory; but Kelway's extempore playing, in the ſtyle of Geminiani, never had the air of ſtudied pieces.

In removing from Bath to London, Kelway was ſoon noticed, and elected organiſt of St. Michael's, Cornhill, where he did not long remain; for on the death of Weldon, he reſigned the organ at St. Michael's church to Mr., afterwards Dr. Boyce; and was elected organiſt of the king's pariſh church, St. Martin's-in-the-Fields, where, of a Sunday afternoon, it was the cuſtom, not only for young organiſts, but the principal profeſſors, to crowd under the organ-loft to hear his voluntaries; in which there was an original and maſterly wildneſs, which long ſupported his character as a great player, in a ſtyle totally different from other organiſts; bold, rapid, and fanciful.

With his harpſichord playing we were unacquainted; but we have often been aſſured, that he conſtantly kept in high practice, Scarlatti's beſt and moſt difficult leſſons, which he executed in a manner peculiarly neat and delicate. As to compoſition, it is to be lamented that he did not exerciſe his pen and fancy more early in life, or that he ever attempted it at all: for on the arrival of Bach, and appointment at court as chamber-muſician to the queen, to whom he dedicated his firſt publication in this country, Mr. Kelway thought it neceſſary, as muſic-maſter to her majeſty, to publiſh a book of harpſichord leſſons, which are, perhaps, the moſt crude, aukward, and unpleaſant pieces of the kind that have ever been engraved. There is a manifeſt want of facility and experience, which proves, that though he was old in practical muſic, he was young in its theory and in compoſition.

Handel, who uſed to go frequently to St. Martin's church to hear him play, always, when indiſpoſed, requeſted Kelway to play the organ for him in his oratorios.

This admirable performer, the moſt brilliant we ever heard, in point of fancy and finger, lived to a great age, but, unhappily, during the laſt years of his life, his intellects were ſomewhat deranged. He died in 1782, and was ſucceeded at St. Martin's church by Dr. Benjamin Cook, organiſt of Weſtminſter Abbey.

KEMA, in *Geography*, a town on the E. coaſt of the iſland of Celebes. N. lat. 1° 8'. E. long. 125° 2'.

Kema, in *Natural Hiſtory*, a name given by Leo Africanus, and other writers of the African hiſtory, to a ſort of ſubterranean production of the vegetable kind, greatly eſteemed as a delicious food. The Arabian writers on medicine have often mentioned it, and that under names ſufficiently reſembling the modern African appellation, ſuch as *camahe*, *camah*, *kemah*, and *camha*. They are not the roots of any plant, but a fine kind of ſubterraneous muſhroom, or truffle, white on the outſide, and which lie generally pretty deep in the earth.

KEMAOON, in *Geography*, a ſmall ſtate, which, with others, forms a tract of country ſeparated from Hindooſtan by lofty mountains, and ſituated to the N. of Oude and Rohilcund.

KEMAR, a town of Aſiatic Turkey, in Natolia; eight miles S. of Sinob.

KEMBELA, a town of Sweden, in the government of Ulea; five miles S. of Ulea.

KEMBERG, a town of Saxony; ſix miles S. of Wittenberg.

KEMER, a town of Aſiatic Turkey, in the government of Trebiſond; 12 miles E.N.E. of Rizeh.

KEMGUR, a town of Hindooſtan, in Bahar; 27 miles N.N.E. of Durbunga.

KEMI, a town of Ruſſia, in the government of Olonetz, at the mouth of the river Kem, on the W. of the White ſea. N. lat. 64° 55'. E. long. 28° 38'.—Alſo, a ſea-port town of Sweden, in Eaſt Bothnia, ſituated on the right bank of the river Kemi, which runs into the gulf of Bothnia, about three miles from its mouth; 10 miles E. of Tornea. N. lat. 66° 49'. E. long. 24° 27'.

KEMIJAN, a town of Hindooſtan, in Bahar; 31 miles S.S.W. of Patna.

KEMITRASK, a town of Sweden, in Eaſt Bothnia, at the N. extremity of a conſiderable lake formed in the river Kemi; 90 miles N.E. of Kemi. N. lat. 66° 42'. E. long. 27° 14'.

KEMLIK, or GHIO, a town of Aſiatic Turkey, on the bay of the ſea of Marmora; 20 miles W. of Iſnik.

KEMMOO, a town of Africa, the metropolis of Kaarta; formerly large and populous, but deſtroyed ſince it was viſited by Mr. Park. N. lat. 14° 20. W. long. 7° 46'.

KEMNAT, a town of Bavaria; 26 miles N. of Amberg. N. lat. 49° 53'. E. long. 11° 55'.

KEMNITZ, a town of Sileſia, in the principality of Jauer, on a river of the ſame name, which runs into the Bober; ſix miles W. of Hirſchberg.

KEMPACH, a town of Tyrol; ſix miles N.W. of Schwas.

KEMPEN, a town of France, in the department of the Roer, and chief place of a canton, in the diſtrict of Creveldt; 15 miles N.E. of Ruremond. The place contains 2870, and the canton 12,830 inhabitants, in 12 communes. It formerly contained a college and three convents, with ſome linen manufactures.—Alſo, a town of the duchy of Warſaw; 26 miles S. of Siradia.

KEMPFERA, in *Botany*, ſo named by Houſtoun, in honour of Dr. Engelbert Kempfer, or rather Kæmpfer, the celebrated traveller and naturaliſt. See VERBENA, and KÆMPFER.

KEMPIS, THOMAS à, in *Biography*, was born in the year 1380, at a village in the dioceſe of Cologne, whence he derived his ſurname. The circumſtances of his parents were ſuch as led them to ſeek for him an education on a charitable foundation. At this place he was diſtinguiſhed for his talents, piety, and attachment to a contemplative life. He entered the monaſtery of Mount St. Agnes, received the habit in 1406, and was ordained prieſt in 1423. He occaſionally filled very important poſts of his order, though it was much againſt his will that he engaged at all in the active duties of life. He died in 1471, at the advanced age of ninety-two. His works are chiefly devotional, and written in an animated ſtyle. The moſt complete edition of them is in three volumes, octavo, publiſhed at Antwerp in 1600, and in 1615. Many of them have been tranſlated into a variety of languages, particularly that entitled "De Imitatione Chriſti," which is to be found in almoſt every known tongue in the world. The beſt Engliſh verſion is that by Dr. George Stanhope, which was printed in 1696, and has been ſeveral times reprinted. The learned are not agreed as to the real author of this celebrated work, though given to Thomas à Kempis by general conſent, many have offered reaſons why he cannot be the writer. The queſtion was warmly agitated for ſixty years, and gave riſe to many curious diſcuſſions, an account of which is given by Dupin.

KEMPSVILLE, in *Geography*, a poſt-town of America, in Prince Ann county, Virginia; 243 miles from Waſhington.

KEMPTEN, a town of Bavaria, on the river Iler, lately Imperial. The burghers and magiſtracy profeſs Lutheraniſm, and in the town are a handſome pariſh church and a grammar ſchool. In 1801, this town and its abbey were given to the elector of Bavaria; 36 miles S. of Augſburg. N. lat. 47° 43'. E. long. 10° 17'.—Alſo, a princely abbey, founded, or at leaſt repaired and enriched, by Hildegard, wife of Charlemagne, in the 8th century. To this abbey belonged ſome towns and villages.

KEMSER, a town of Bengal; 15 miles S.S.E. of Curruckpour.

KEMSKOI, a town of Ruſſia, in the government of Tobolſk. N. lat. 57° 25′. E. long. 92°.

KEN, Thomas, in *Biography*, an Engliſh prelate, was born at Berkhamſtead, in Hertfordſhire, in the year 1637. He received his claſſical education at Wincheſter ſchool, was elected ſcholar, and removed in due time to New-College, Oxford, of which he was choſen fellow. After taking his degrees he entered into holy orders, and became chaplain to lord Maynard, comptroller of the houſhold to king Charles II. In 1666, he was choſen fellow of Wincheſter college, and in a ſhort time afterwards was appointed domeſtic chaplain to Dr. Morley, biſhop of Wincheſter, from whom he received a preſentation to the rectory of Brixton, in the Iſle of Wight, and afterwards, in 1669, to a prebend in the church of Wincheſter. About the year 1673, the ſame friend and patron gave him the rectory of Woodhey, in Hampſhire, which, however, he ſoon reſigned, conceiving that he ought to be ſatisfied with the emoluments which he had previouſly poſſeſſed. In 1675, he went, in company with his nephew, Mr. Iſaac Walton, to Rome, and on his return he uſed to ſay he was grateful for the effect produced by the journey, inaſmuch as he was more ſtrongly confirmed in his belief of the excellence of the reformed religion, by witneſſing the abſurdities of the ſuperſtitions practiſed abroad. In 1679, he took his degree of doctor of divinity, and being appointed chaplain to the princeſs of Orange, he went to Holland. He diſcharged the duties of his office with ſo much prudence and zeal, as to ſecure the eſteem and confidence of his royal miſtreſs, but he incurred the temporary diſpleaſure of her conſort, afterwards William III. of England, by obliging one of his favourites to fulfil his engagement to a young lady of the princeſs's train, whom he had ſeduced under a promiſe of marriage. On his arrival in England he was appointed chaplain to lord Dartmouth, who received a commiſſion to demoliſh the fortifications of Tangiers, and on his return from this expedition, he was immediately advanced to be chaplain to the king, by an expreſs order from his majeſty, who hoped thereby to render him ſubſervient to his meaſures, and to the laxity of his morals. When the court removed to Wincheſter, the ſovereign deſired Dr. Ken to admit into his prebendal houſe Eleanor Gwyn, one of the king's miſtreſſes, but he poſitively refuſed to ſubmit to an arrangement which might appear to give countenance to vice; and Charles, ſo far from being offended with this deciſive proof of religious intrepidity, took an early opportunity of raiſing him to the epiſcopal bench, by preſenting him with the ſee of Bath and Wells. Within a few days of this appointment the king was attacked by his laſt illneſs, during which the biſhop attended him in the moſt ſedulous manner, endeavouring, though, it is ſaid, ineffectually, to awaken the king's conſcience to a ſenſe of ſorrow for his paſt profligate life. Neverthelefs the biſhop did not heſitate to pronounce abſolution over his majeſty without receiving any declaration of repentance, for which he has been deſervedly cenſured; though it is to be feared, that almoſt all death-bed repentances, being the effect of dread of the future, can avail the ſuppoſed penitents very little with regard to a future ſtate. The biſhop was exemplary in performing the duties of his ſtation, and was inceſſantly deviſing means for relieving the poor, and inſtructing the ignorant. With this view he built the firſt workhouſe at Wells, which has proved the model for numbers that have been erected ſince his time; and he eſtabliſhed many ſchools in all the great towns of his dioceſe. To theſe, and many other ſimilar objects, Dr. Ken devoted the principal part of the income of his ſee. He was a warm friend to the doctrine of paſſive obedience and non-reſiſtance, and on that account was at firſt well received by James II., but when that prince endeavoured to introduce popery as the eſtabliſhed religion of the country, he found it expedient to act upon more conſtitutional grounds, and to oppoſe the meaſures of the court with ſpirit and zeal. He was one of the ſeven biſhops ſent to the Tower for reſiſting that monarch's diſpenſing power, and for petitioning in behalf of their own and the people's rights. The biſhop and his brethren, though charged with high treaſon, were honourably acquitted, to the inexpreſſible joy of every friend to the country. At the Revolution he refuſed to transfer his allegiance to the new ſovereigns, and, declining to take the oaths required of him, was deprived of his biſhopric. He now lived a life of retirement, but conſidered himſelf ſtill as biſhop in right, though not in fact, conceiving that no human power could ſeparate him from the relationſhip which he bore to his dioceſe. Upon the death of his firſt ſucceſſor, Dr. Kidder, he urged Dr. Hooper, who had been nominated to the vacant biſhopric, to accept it, and ever afterwards ſigned himſelf "late biſhop of Bath and Wells." From this time the queen ſettled on him a penſion of 200*l.* per ann. which he enjoyed ſo long as he lived. He died, as he was on a journey to Bath, in March 1710-11, in the 74th year of his age. He had been in the habit of travelling many years with his ſhroud in his portmanteau, which he always put on when attacked by illneſs: of this he gave notice the day before his death, in order to prevent his body from being ſtripped. His works, which are all of a theological and practical turn, were collected, in 1721, in four volumes octavo. Biog. Brit.

Ken, in *Geography*, a town of Hindooſtan, in the province of Behker; 20 miles N. of Behker.—Alſo, a ſmall low iſland in the Perſian gulf, in which are a few ſhrubs. N. lat. 27° 54′. E. long. 50° 76′.

KENAMOW, a town of Hindooſtan, in Oude; 30 miles S.S.E. of Caunpour.

KENAPOOSSAN, a ſmall iſland in the Eaſt Indian ſea, in the Sooloo Archipelago. N. lat. 5° 12′. E. long. 120° 23′.

KENAREI-HAVAZ, a town of Hindooſtan, in Moultan; 20 miles E. of Batnir.

KENAWAS, a town of Hindooſtan, in the circar of Kitchwarah; 17 miles W. of Sheergur.

KENCHESTER. See Ariconium and Hereford.

KENDAL, or Kentdale, a market town and pariſh in the ward of Kendal, and county of Weſtmoreland, England, is built in a pleaſant valley on the weſtern banks of the river Kent, over which there are three bridges. The town conſiſts of one principal ſtreet running north and ſouth, with ſeveral ſmaller ones branching off at right angles. Kendal has long been famed for its manufacture of cottons. In the year 1800, Houſeman ſtates that the town contained 12 manufactories engaged in this buſineſs, and that about 1200 pieces of cotton were made weekly, each of which contained about 24 pounds of wool. The buſineſs was then increaſing. Eight houſes were alſo engaged in the linſey manufacture, and "ſeveral other manufactures of leſs conſequence are carried on. There are likewiſe a conſiderable number of perſons employed in working and poliſhing marble, which, in the beauty and variety of its colours, is thought by many to be ſuperior even to that imported from Greece and Italy. Mr. Wakefield manufactures large quantities of gunpowder at his mills a little below the town." The public buildings of Kendal are the church, a large and commodious workhouſe, and a bridewell. Near the church is a handſome houſe called Abbot-hall, the property of ſir Alan Chambre, one of the judges of the court of common pleas. To the eaſt of the town are the remains of a caſtle, which is ſuppoſed to have been built by the firſt barons of Kendal. It was formerly a place of conſiderable extent and ſtrength; but its towers and walls are much mutilated and reduced. Parts of two ſquare and two round towers, however, ſtill remain, as well as great part of the wall round the outer ballium. Another object of antiquity is an artificial mount, called by the inhabitants Caſtle-law-hill. In the town are chapels for Quakers, Methodiſts, Preſbyterians, and Roman Catholics. The chief manufacturers and tradeſmen of the town are united into twelve companies, each of which has a hall: *viz.* Mercers, Tanners, Glovers, Sheermen, Cordwainers, Taylors, Pewterers, &c. Kendal is 22 miles from Lancaſter, and 260 N. of London. In the year 1800 it contained 1424 houſes, and 6892 inhabitants. Nicholſon and Burn's Hiſtory of Weſtmoreland, &c. two vols. 4to.; and Houſeman's "Deſcriptive Tour through various Northern Counties," &c. 8vo. 1800.

KENDER, a town of Hindooſtan, in Sehaurunpour; 10 miles N. of Sehaurunpour.—Alſo, a town of Curdiſtan; 28 miles S.W. of Betlis.

KENDRICK's ISLAND, an iſland which forms the W. ſide of Nootka Sound, into which there is an entrance from the W. by Maſſachuſett's Sound, along the northern ſide of the iſland.

KENDUSKEAG, a river of America, which runs into the Penobſcot at the town of Bangor, about two miles below the head of the tide; where is a thriving village of handſome houſes, and a place of the greateſt trade in the river.

KENDY, a town of Bengal; 50 miles N.N.E. of Ramgur. N. lat. 24° 16′. E. long. 85° 6′.

KENE′. See CÆNE′ and GHINNA.

KENEF, a town of Perſia, in the province of Khoraſan; 45 miles N. of Herat.

KENERA, or KENEREH, a mountain on the iſland of Salſette, near Bombay, celebrated for the number and extent of its excavations. Its principal cavern is arched, in the ſtyle of that deſcribed under the article KARLY; and was evidently, from its ſtile of ſculpture, a temple of the god Budha, or Boodh. (See BOODH.) On each ſide of the veſtibule are ſtanding figures of the god, in eaſy attitudes, of tolerable proportions, and well ſculptured in alto-relievo, fourteen feet high. This cave and three figures are elegantly repreſented in Daniel's fine ſeries of oriental ſcenery. See KARLY.

KENFIG, or CYNFIG, a pariſh of Glamorganſhire, South Wales, is noticed in this work, chiefly to correct the errors of other topographical writings; in moſt of which it is deſcribed as a town. Mr. Donavan, in his "Deſcriptive Excurſions through South Wales," deſcribes it as a poor, ſmall village, inhabited moſtly by ſailors and ſmugglers, and repreſents theſe as being particularly rude and inſulting to ſtrangers. A cluſter of mean cottages, grouped together, with a church on a ridge of riſing ground, conſtitute this village. In this pariſh is Kenfig-pool, a lake of freſh water, which "is emboſomed in a depreſſion of an irregular form, in the midſt of ſands that have been apparently drifted upon this ſpot from the contiguous coaſt, and though lying within a very ſhort diſtance of the ſea at flood tide, invariably retains its freſhneſs pure and untainted by the muriatic properties of the former. The circumference of this pool is eſtimated at a mile and three quarters. The depth is great in ſome places. Indeed it has the reputation of being, in many parts, unfathomable." It is traditionally ſaid, that a town formerly occupied this ſpot, and that it was ſwallowed up by an earthquake. At a ſhort diſtance from this lake, on an eminence, are ſome ruins, called Kenſig-caſtle, which was only a ſmall fortreſs. In 1800, this pariſh contained 156 houſes, and 655 inhabitants.

KENGHEVAR, a town of Perſia, in Irak, on a river which runs into the Karaſu; 240 miles N. of Iſpahan. N. lat. 34° 20′. E. long. 47° 10′.

KENJAR, a town of Hindooſtan, in Bahar; 30 miles S.W. of Patna.

KENILWORTH, a market town and pariſh in the hundred of Knightlow and county of Warwick, England, is famed in the annals of the kingdom for its ancient caſtle, "which," ſays Dugdale, "was the glory of all theſe parts, and for many reſpects may be ranked, in a third place at the leaſt, with the moſt ſtately caſtles of England." This fortreſs was built by Geoffry de Clinton in the time of Henry I. He was chamberlain and treaſurer to that monarch. By ſubſequent kings and occupiers it was greatly enlarged and ſtrengthened at different times: and in the various civil and domeſtic wars of England, it was frequently the object of contention with different monarchs and nobles. To detail ſuch particulars would be foreign to the nature of this work; but the reader may find much curious and intereſting information relating to the ſame, in Dugdale's "Antiquities of Warwickſhire." What remains of the buildings ſhew that the whole was an immenſe and ſpacious pile: conſiſting of an outer wall with baſtion towers, a tilt-yard, with towers at each end; and ſeveral buildings within the ballium, or baſe-court. The area within the walls conſiſts of ſeven acres. There were four gatehouſes, and the walls were from ten to fifteen feet in thickneſs. At a ſhort diſtance from the caſtle was a priory for Black canons. Of the buildings, parts of the gateway and chapel remain. Near theſe is the pariſh church, the weſtern door-way of which is a curious ſpecimen of ancient architecture. In the town are two meeting-houſes, or chapels. Kenilworth is five miles from Warwick, and five from Coventry. In 1800, the town contained 418 houſes, and 1968 inhabitants. Dugdale's Antiquities of Warwickſhire.

KENKRI, a town of European Turkey, in Livadia; 40 miles W. of Athens.

KENKS, in the *Sea Phraſe,* are doublings in a cable or rope, when it is handed in or out, ſo that it does not run ſmooth, or when any rope makes turns, and does not run ſmooth and clever in the block, they ſay it makes kenks.

KENMARE TOWN, called *Nedeen,* in *Geography,* a poſt-town of the county of Kerry, province of Munſter, Ireland. It is ſituated at the north-eaſt extremity of an extenſive river or bay on the Atlantic ocean. Kenmare is 155 miles S.W. from Dublin, and 12 miles S. from Killarney.

KENMARE *River,* a river or arm of the Atlantic ocean, on the coaſt of Ireland, which extends about 20 miles in length, and about three in breadth, ſituated at the ſouth-weſt ſide of the county of Kerry. It affords a ſafe and capacious harbour, but little frequented. The mouth is ſituated in N. lat. 51° 40′. W. long. 9° 57′.

KENNEBECK, a river of America, which, next to Penobſcot, is the fineſt in Maine. Three miles from the mouth, the waters of the river are divided by Swan iſland, ſeven miles in length; on both ſides of which they are navigable: at the diſtance of 38 miles from the ſea is the iſland Nahunkeag, ſignifying the land where eels are taken. Within three miles of this iſland, a ſmall river, iſſuing from ponds in the town of Winthrop, runs into the Kennebeck, and it is known by the Indian name Cobbiſſeconteag, denoting the place where ſturgeons are taken. Six miles higher is the head of the navigable waters, which is a baſon four miles from the ſea, and commodious for the anchorage of veſſels. Where the navigation terminates ſtands Fort Weſtern, erected in 1752. From this fort to Taconnet Fall is a diſtance of 18 miles. On the eaſtern ſide of the river near the fall is Fort Halifax, erected in 1754, ſituated on the point of land where the Sabaſtacook makes an addition of one-third to the ſize of the Kennebeck. Thirty miles above Halifax fort Sandy river flows into the Kennebeck; and about 40 miles higher, the Kennebeck takes a S.W. courſe; and 50 miles from Halifax fort it receives the eaſtern branch. The main branch of the Kennebeck, in its courſe through the wilderneſs, forms ſeveral carrying places or portages. At about 100 miles diſtance from the mouth of the eaſtern branch, the ſource of the main or weſtern branch extends to a great diſtance along the ſide of the Chaudiere, which carries the waters from the highlands into the St. Lawrence. The eaſtern branch iſſues from a body of waters which lie N., about 20 miles from the confluence of the two branches. Theſe waters are called Mooſe pond, or lake. The ſides of the lake are very crooked, ſo that it forms an irregular figure, containing three times as much water as Lake George. To the N. and W. of the lake are high mountains, from which waters run by many channels to the St. Lawrence. The Kennebeck affords great quantities of lumber, and is inhabited, at different ſeaſons, by ſeveral ſpecies of valuable fiſh; particularly ſalmon and ſturgeon, ſhad, and alewives. This river forms the neareſt ſea-port for the people on the upper part of the river Connecticut. From the Upper Cohos, or Coos, on the latter river, to the tide water in Kennebeck, is a diſtance of 90 meaſured miles.—Kennebeck is alſo a county in the diſtrict of Maine, and the firſt inland county erected in this diſtrict. It was ſeparated from the maritime county of Lincoln, by which it is bounded on the S., by Hancock county on the E., by Cumberland on the W., and by the Highlands on the N. It was incorporated in February 1799, and derives its name from the river, which, paſſing through it, divides it nearly in equal parts. It is about 40 miles wide and upwards of 100 miles long. The ſoil is better and more eaſily cultivated than that on the ſea-coaſt. It contains 24,402 inhabitants.

KENNEBUNK, a river of Maine, having at its mouth a good harbour, whence great quantities of lumber are ſhipped. This river divides the townſhips of Wells and Arundel. After running a ſhort courſe, it diſcharges itſelf into the ſea between Capes Porpoiſe and Neddick.—Kennebunk is alſo the Indian name of the place, ſince called Wells, in Maine, about 33 miles below Portſmouth, in New Hampſhire; in which is a poſt-office.

KENNEDY's Creek, a river of Kentucky, which runs into the Ohio, N. lat. 58° 30′. W. long. 83° 36′.

KENNEL, a term uſed indifferently for a puddle, a water-courſe in the ſtreets, a houſe for a pack of hounds, and the pack or cry of hounds themſelves.

Among ſportſmen, a fox is ſaid to *kennel*, when he lies cloſe in his hole.

On a preſumption that a kennel for hounds is to be erected, its ſeite is thus deſcribed by Somerville:

> " Upon ſome little eminence erect,
> And fronting to the ruddy dawn; its courts
> On either hand wide opening to receive
> The ſun's all cheering beams, when mild he ſhines
> And gilds the mountain tops."

However, this ſelection of a high ſituation is incompatible with a running brook; and as theſe two advantages cannot be united, water is to be preferred, with the aſpect to the morning ſun as much attended to as poſſible. The number of its inmates muſt regulate the ſize of the kennel, and the architecture ſhould be neat without being uſeleſsly expenſive. The moſt magnificent is the duke of Richmond's, at Goodwood, which coſt 19,000*l.* and is ſufficiently extenſive for two packs of hounds. The building compriſes five kennels; two 36 by 15, three 30 by 15, and two feeding rooms 20 by 15 feet, with ſtoves for warming the air when too cold. The huntſman and whipper-in have each a parlour, kitchen, and ſleeping room. The kennel ſhould be near the houſe, that it may be duly inſpected; as cleanlineſs is no leſs eſſential than food. There ſhould be room for two kennels under the ſame roof, for the convenience of keeping both clean, and for removing the hounds from one to the other, when they are waſhed. Beſides, a ſecond kennel will afford opportunity for drafting the hounds that are intended for hunting the next morning. Hounds will ſoon learn to anſwer to their names, and in drafting them, they may be eaſily counted into the hunting kennel. When the feeder firſt enters the kennel in the morning, he ſhould let the hounds into the outer court; and the lodging room ſhould be then thoroughly cleaned, the windows and doors opened, the litter well ſhaken, and the kennel be made ſweet, before the hounds are again ſhut into it. The lodging room ſhould be bricked, and ſloped on both ſides to the centre, and a gutter ſhould be provided for carrying off the water, ſo that the floor, when waſhed, may be ſoon dried. It ſhould be recollected, that nothing is more hurtful to hounds than damp, or more refreſhing than warmth, after hard work. The kennel ſhould have three doors, two in front and one behind; the latter having a lattice window in it with a wooden ſhutter, which is to be always kept cloſed, except in ſummer, when it ſhould be left open during the whole of the day. The large centre window ſhould have a folding ſhutter, which at night, according to the weather, may be wholly or partially cloſed, and thus the warmth of the kennel may be regulated according to circumſtances, and as it may be judged neceſſary. The two great lodging rooms are exactly ſimilar, and having a court belonging to each, are diſtinct kennels, ſituated at the oppoſite ends of the building; in the centre are the boiling houſe and feeding yard; a leſſer kennel, either for hounds that are drafted off, or thoſe that are ſick and lame, or for any other neceſſary purpoſe, is on each ſide; at the back of which, as it is but half the depth of the two larger kennels, are places for coals, &c. for the uſe of the kennel. There is alſo a ſmall building in the rear for hot bitches. The inner court floors ſhould be bricked or flagged, and ſloped towards the centre, like thoſe of the lodging rooms; and water brought in by a leaden pipe, ſhould run through the channel in the middle. In the centre of each court is a well, large enough to dip a bucket to clean the kennel; to keep theſe from wanting repair, they ſhould be faced with ſtone; to that of the feeding-yard a wooden cover ſhould be fixed. The benches, which muſt be open to let the urine through, ſhould have hinges and hooks in the wall, that they may fold up when the kennel is waſhed: they ſhould be made as low as poſſible, that when a hound is tired, he may have no difficulty in jumping up, and at no time be able to creep under. A large brick court in front, having a graſs court adjoining, and a brook running through the middle of it, completes the kennel. This court ſhould be planted round, and alſo have lime and horſe-cheſnut trees near the centre for ſhade; ſome poſts bound round with ſtraw rubbed with galbanum, may be placed to prevent the hounds urining againſt the trees. The brook may be uſed as a cold bath for hounds lamed in the ſtiſle, and ſtrained. A high pale ſhould incloſe the whole, which, to the height of four feet, ſhould be cloſe, the other open two inches wide. At the back of the kennel ſhould be a thatched houſe, fenced up at the ſides, to contain at leaſt a load of ſtraw ; a pit for receiving the dung, and a gallows for the fleſh. If a piece of ground adjoining the kennel can be incloſed for ſuch dog-horſes as may be brought alive, it will be very ſerviceable, as the diſorders of condemned horſes are not always to be diſcovered, and may be dangerous to others ; the hounds may alſo be brought into this field to employ themſelves after feeding ; and the draft for the next day's hunting can here be more accurately made than when they are confined in the kennel. Stoves are uſed in ſome kennels ; but a good feeder, and the mop properly applied, render them needleſs. Should ticks at any time be troubleſome, the walls of the kennel ſhould be well waſhed ; and if they are not thus deſtroyed, the walls ſhould be white-waſhed. When the hunting ſeaſon is over, one kennel will ſuffice ; the other, with the adjoining graſs-yard, may be allotted to the young hounds. If there be convenience, the dogs ſhould be kept ſeparate from the bitches during the ſummer months. When hounds are very riotous, the feeder may ſleep in a cot in the adjoining kennel, and if they be well chaſtiſed at the firſt quarrel, his voice will be ſufficient afterwards. A feeder in Oxfordſhire pulls a bell, the meaning of which he has taught the hounds to underſtand ; and it ſilences them immediately, without his having the trouble to leave his bed. The farther removed a kennel is from a road or pathway, the quieter will it be. The interior regulations of a kennel comprehend the feeder, the ſorts of food, and the mode of preparing and adapting it to the appetites of the hounds. A good feeder, young, active, induſtrious, and good-tempered, is eſſential. The exquiſite ſenſe of ſmelling peculiar to the hound, being that on which the ſport principally depends, ſhould be carefully preſerved ; and nothing ſo much contributes to this purpoſe as cleanlineſs. It is, therefore, of the greateſt importance that the kennel ſhould be kept clean and ſweet, The heartieſt and beſt food for hounds is oatmeal ; which ſhould be preſerved in binns or ſugar hogſheads ; for the older the meal is the better. The boiler ſhould be of caſt iron ; and in ſize proportioned to the number of hounds in kennel. The fleſh ſhould be thoroughly boiled, and taken out of the broth with the ſtrainer, before the oatmeal is put into it. After about three quarters of an hour's boiling, the liquor may be taken off and left to cool, which will ſoon become a ſtrong jelly, and for hunting hounds it cannot be too compact. Five or ſix pecks of good old oatmeal will thicken a boiler of broth, ſufficient for two feeds for 30 couple of hounds. The meat ſhould never be given to the hounds too hot. The feeding troughs ſhould be wide at bottom and have wooden covers ; nor ſhould they be made too long, as they are leſs convenient for being moved. After all, great attention to the time and mode of feeding will be required on the part of the kennel huntſman. He ſhould be accuſtomed to call each hound by name, when he is fed ; when a hound is called, he ſhould approach the huntſman, and when he is touched with a ſtick, he ſhould follow any where. By thus uſing hounds to their names, they will learn obedience. The day before hunting the hounds ſhould be fed at eight in the morning, and three in the afternoon. Thoſe that are to hunt the next day ſhould be drafted into the feeding-yard, when about three buckets of thick mixed oatmeal is prepared for them ; and the tender and bad feeders ſhould have a handful of boiled fleſh given to them afterwards. If hounds be low in condition, and have far to go to cover, they may all have a little thin lap again in the evening ; but this ſhould never be given, if you hunt early. Hounds ſhould be ſharp ſet before hunting, as in this ſtate they run the better. During the hunting ſeaſon, hounds ſhould have one pound of ſulphur given them in their meat, and when the ſeaſon is over, half a pound of antimony ſhould be added to the ſulphur and well mixed with the meat. Greens boiled in their meat, once a week, are likewiſe proper. A horſe killed and given to hounds whilſt warm, after a very hard day, is an excellent meal ; but they ſhould not hunt till the third day after it. The bones broken are good for poor hounds ; ſheep-trotters are very ſweet food ; and bullocks' paunches may alſo be of ſervice, in the ſcarcity of horſe-fleſh. Immediately when hounds return from hunting, they ſhould be fed ; and if they have had a ſevere day, ſome hours after they ſhould be fed again. By turning them out from the lodging-houſe to be fed, they will be refreſhed, and ſtretch their limbs ; and beſides the litter being ſhaken up, and the kennel cleaned out, they ſettle themſelves better on the benches afterwards. At all times after being fed, the hounds ſhould be turned into the graſs-court to empty themſelves ; as this practice will not a little contribute to the cleanlineſs of the kennel. Hounds ſhould be ſhut up warm at night after hunting. Daniel's Rural Sports, vol. i. See HOUNDS and HUNTING.

KENNERY, in *Geography*, a ſmall iſland near the coaſt of Malabar, ſurrounded with a wall and towers. N. lat. 18° 42′.

KENNET, a river of England, which riſes near a village of the ſame name in Wiltſhire, paſſes by Marlborough, Hungerford, and Newbury, whence it is made navigable to the Thames, which it joins a little below Reading. See CANAL.

KENNET, a townſhip of America, in Cheſter county, Pennſylvania.

KENNETH II., in *Biography*, king of Scotland, ſucceeded his father Alpin in 823. He made war upon the Picts, and ſubdued their dominions in the north, which he divided among his ſoldiers. He tranſlated the ſtone chair to Scone, where his ſucceſſors were crowned, till it was removed by Edward I. He died in the year 854.

KENNETH III., ſon of Malcolm, ſubdued the Britons of Strathcluyd, and was equally ſucceſsful againſt the Danes, who had invaded his dominions, but attempting to alter the ſucceſſion of his crown in favour of his family, he was aſſaſſinated in 994.

KENNETS, in our *Old Writers*, a ſort of coarſe Welſh cloth, mentioned in the ſtat. 33 Hen. VIII. c. 3.

KENNETS, in a *Ship*, are ſmall pieces of timber, nailed to the inſide of the ſhip, into which the tacks and ſheets are belayed (as they call it), *i. e.* faſtened.

KENNETT, WHITE, in *Biography*, a learned Engliſh prelate, ſon of the Rev. Baſil Kennett, rector of Dimchurch, in Kent, was born at Dover in the year 1660. He received the early part of his education in the country, and made ſuch progreſs in claſſical learning, that upon his being removed to Weſtminſter, he was admitted into the upper ſchool. Immediately after his admiſſion he fell ſick of the ſmall-pox, which obliged him to wait another year before he could be received into the ſchool. During this period he undertook the office of tutor to a gentleman's ſon in the neighbourhood. He entered himſelf at Oxford in 1678, and went through the ſtudies and exerciſes of the place with great reputation. While he was an under-graduate, he was introduced to the acquaintance of Anthony Wood, and employed by him in collecting epitaphs, and other notices of eminent men, who had been members of Oxford. Mr. Kennett was particularly attached to the ſeveral branches of polite literature, connected with antiquities and hiſtory. But his career as an author commenced in the publication of a political tract while he was under-graduate, entitled " A Letter from a Student at

Oxford to a Friend in the Country concerning the approaching Parliament, in Vindication of his Majeſty, the Church of England, and the Univerſity." It was written in defence of court meaſures, and ſupported principles which he renounced in his maturer years. The Whig party in parliament were ſo much offended with it, that enquiries were made after the author, in order to get him puniſhed, but the ſudden diſſolution of parliament preſerved him from the effects of their reſentment. Mr. Kennett took his degree of B.A. in 1682, and in the following year he publiſhed an Engliſh tranſlation of Eraſmus's "Moriæ Encomium;" entitled "Wit againſt Wiſdom, or a Panegyric upon Folly." He entered into holy orders about the year 1694, and in the following year he was preſented to the vicarage of Amerſden, in Oxford, by ſir William Glynne, to whom he dedicated "An Addreſs of Thanks to a good Prince, preſented in the Panegyric of Pliny upon Trajan, the beſt of Roman Emperors." Mr. Kennett diſtinguiſhed himſelf by preaching againſt Popery, though he did not engage in the famous Popiſh controverſy. While he was out on a ſhooting party, he received a dangerous wound on his head, which obliged him to undergo the operation of trepanning: he, however, ſoon recovered, and was choſen lecturer at St. Martin's, Oxford: he was likewiſe choſen tutor and vice-principal at Edmund Hall, where he lived in terms of friendſhip with the principal Dr. John Mill, who was at this time employed in preparing for the preſs his celebrated edition of the New Teſtament. In 1693, he obtained the rectory of Shotteſbrook, in Berkſhire, and, in 1695, he commenced D.D., and in the following year was preſented to the living of St. Boltolph, Aldgate, having been already appointed arch-deacon of Lincoln. In 1701 he engaged in a controverſy on the rights of the convocation againſt Dr. Atterbury. In 1705, upon the advancement of Dr. Wake to the ſee of Lincoln, Dr. Kennett was appointed to preach his conſecration ſermon; which was publiſhed at the deſire of the archbiſhops and biſhops, and was greatly admired by lord chief juſtice Holt, who declared that it contained more to the purpoſe of the legal and Chriſtian conſtitution of the church of England than any volume of diſcourſes. In 1707 he was made dean of Peterborough, but he was growing very unpopular on account of his Whig principles and his oppoſition to Dr. Sacheverel: nevertheleſs, in the ſame year, he was allowed to exchange his living in Aldgate for the rectory of St. Mary Aldermary, in order that he might have more leiſure for ſtudy and retirement. The zeal which dean Kennett diſplayed in oppoſition to the claims of the high church clergy, and the ſentiments of moderation which he diſcovered towards the Diſſenters, as well as his attachment to the Proteſtant ſucceſſion, and the intereſts of civil liberty, rendered him very obnoxious to the Tories, who took every method in their power to expoſe him, one of which was deviſed by Dr. Wilton, rector of Whitechapel, who was afterwards deprived of his living as a nonjuror. This clergyman preſenting a new altar-piece, repreſenting the Laſt Supper, to his church, cauſed the figure intended for Judas Iſcariot to be drawn as a likeneſs of the dean of Peterborough, with a black patch on his head, ſimilar to one which Dr. Kennett wore on the wound which he had formerly received. It was ſoon known for whom the caricature was intended, and people came in crowds to ſee it. But by all moderate people of both parties, it was regarded as an inſolent and profane proſtitution of what was intended for the moſt ſacred uſes, and the biſhop of London, without any interference on the part of the dean, ordered it to be taken down. After the acceſſion of king George I., and when a rebellion was breaking out in Scotland, he preached with the utmoſt boldneſs in defence of the preſent ſettlement of the government of the houſe of Hanover: he uſed to ſay, he was ready to live or die in defence of the glorious principles of the Revolution, and that he would go out to fight, when he could no longer preach in defence of them. He warmly oppoſed the proceedings in the convocation againſt Dr. Hoadly, biſhop of Bangor, on whoſe ſide he was deeply engaged in the Bangorian controverſy. His zeal in the cauſe of civil and religious liberty was, in the year 1718, rewarded by the biſhopric of Peterborough, which he enjoyed ten years. He died in 1728, in the ſixty-ninth year of his age. His principal works are, 1. "The Life of William Somner," which was prefixed to Mr. Brome's edition of the famous antiquary's "Treatiſe of the Roman Ports and Forts in Kent." 2. A collection of Engliſh hiſtorians, under the title of "The Complete Hiſtory of England," in three vols. folio, the laſt of which was written by himſelf. 3. "Hiſtorical Account of Appropriations." Biſhop Kennett ſuſtains a conſiderable rank in the epiſcopal order for learning and abilities. He was deeply read in Engliſh hiſtory and antiquities, though he was by no means deficient in that kind of knowledge which was the more immediate buſineſs of his profeſſion. He was anxious to diſcharge the duties of his miniſterial functions with credit to himſelf, and advantage to thoſe who were the immediate ſubjects of his paſtoral care; nor did the high rank to which he attained lead him to neglect the duties of a pariſh-prieſt. He was acceſſible and communicative, a true friend, as well as an admirable pattern to his clergy, and thoſe of them who diſtinguiſhed themſelves either by their learning, or by a zealous diſcharge of their parochial duties, were ſure of his reſpect and encouragement.

Kennett, Basil, younger brother of the above, was born at Poſtling, in Kent, in 1674, and educated at Corpus Chriſti college, Oxford. In 1696, he publiſhed "Romæ Antiquæ Notitia, or the Antiquities of Rome," a work that for a century was generally uſed in our claſſical ſchools. In the following year he gave to the public "The Lives and Characters of the Ancient Greek Poets;" and he was about the ſame time elected a fellow of his college, and entered into orders. He was author likewiſe of "An Expoſition of the Apoſtles' Creed, according to Biſhop Pearſon," and "An Eſſay towards a Paraphraſe on the Pſalms in Verſe, with a Paraphraſe on the third Chapter of Revelations." In 1706, he was appointed chaplain to the Engliſh factory at Leghorn; in this office he conducted himſelf with ſo much prudence and propriety that he acquired univerſal eſteem, even from the Catholics, who had uſed every effort to prevent his officiating in that capacity. In 1714, he returned to England, and commenced D.D., but died in a few months afterwards. A volume of his ſermons, prepared for the preſs during his life, was publiſhed in the year 1715. Biog. Brit.

KENNICOTT, Benjamin, a learned Engliſh divine, and oriental ſcholar, was born at Totneſs, in Devonſhire, in the year 1718. His father was maſter of a charity-ſchool in that place, and the ſon ſucceeded to the employment at a very early age. While in this ſituation his talents were diſcovered, and a ſubſcription entered into, in order to procure him the advantages of an academical education. He accordingly was entered of Wadham college, Oxford, where he ſoon diſtinguiſhed himſelf in that department of ſtudy in which he afterwards became ſo eminent. He commenced his career as an author while he was an under-graduate, by publiſhing two diſſertations: the firſt "On the Tree of Life in Paradiſe, with ſome Obſervations on the Fall of Man;" the ſecond "On the Oblation of Cain and Abel." This work procured the author the extraordinary honour of having the degree of B.A. conferred on him by the univerſity a year before the ſtatutable period ; and likewiſe was the means of obtaining for him a fellowſhip of Exeter college. When he was of a ſufficient ſtanding, he took the degree of M.A. and about the ſame period he was admitted to holy orders. In the year 1753, he laid the foundation of his great work, by publiſhing "The State of the Hebrew Text of the Old Teſtament conſidered ; a Diſſertation in two Parts, &c." The deſign of this publication was to overthrow the ſtrange notion which had long prevailed among divines concerning what is called the integrity of the Hebrew text ; *viz.* that the copies of it had been preſerved abſolutely pure and uncorrupt. This notion had been thrown out and vindicated by Capellus, but though his arguments were ſupported by the authority of the Samaritan Pentateuch, that of parallel paſſages, and the ancient verſions, yet as he had no opportunity of conſulting MSS. he could never prove his point. This taſk was reſerved for Mr. Kennicott. His diſſertation proved that there were many Hebrew MSS. extant, which, though they had hitherto been generally ſuppoſed to agree with each other, and with the printed Hebrew text, yet contained numerous and important various readings, and that from theſe conſiderable authority was derived in ſupport of the ancient verſions. This work was examined with great ſeverity, both at home and abroad : many excellent and learned Chriſtians imagined that it was opening wide a door to infidelity, and that the cauſe of their holy religion would be much injured by it ; but by the generality of learned and candid biblical ſcholars, both natives and foreigners, its value was juſtly appreciated, and they were led to form high expectations of the author's future labours in the ſervice of ſacred criticiſm. Mr. Kennicott ſpent the next three or four years principally in ſearching out and examining Hebrew MSS. In 1759, he was preſented to the vicarage of Culham, in Oxfordſhire, and in the following year he publiſhed his "State of the printed Hebrew Text of the Old Teſtament conſidered." In this volume he vindicated the authority and antiquity of the Samaritan copy of the Pentateuch ;—proved that the preſent Chaldee paraphraſe has not been taken from MSS. ſo very ancient as has been generally ſuppoſed, and that it has been, in ſome caſes wilfully, altered in conformity to the Hebrew text, where that text itſelf had been corrupted ;—appealed to the ſentiments of the Jews themſelves on the ſubject of the Hebrew text, and gave a hiſtory of it from the cloſe of the Hebrew canon, down to the invention of printing, and preſented an account of all the Hebrew MSS. then known, with a collation of eleven Samaritan MSS., and a particular catalogue of 110 Hebrew MSS. in Oxford, Cambridge, and the Britiſh Muſeum. Mr. Kennicott now publiſhed propoſals for collating all the Hebrew MSS. prior to the invention of printing, that could be found in Great Britain and Ireland, and for procuring as many collations of foreign MSS. of note, as the time and money he ſhould receive would permit. In this undertaking he was ſupported with the moſt liberal ſubſcriptions from perſons of all parties, and of the very higheſt ranks in ſociety, and he bent his whole powers to complete the very arduous undertaking. While he was proceeding in the work he was appointed keeper of the Radcliffe library ; admitted to the degree of doctor of divinity ; preſented to a living in Cornwall, and rewarded by a canonry of Chriſt-church, Oxford. In the year 1776, Dr. Kennicott publiſhed the firſt volume of his Hebrew bible, and in the year 1780 the ſecond volume, which completed the deſign, made its appearance. To the whole was prefixed a general diſſertation, giving a full hiſtory of the nature of the deſign, and of the benefits likely to reſult from it. The various readings which are inſerted in it are the reſult of a collation of ſix hundred MSS. Such a work, and ſo important to the beſt intereſts of mankind, reflects very high honour on the country in which it was firſt patronized and carried into execution. Within two years of his death, Dr. Kennicott reſigned his living in Cornwall, from conſcientious motives, on account of his not having a proſpect of ever again being able to viſit his pariſh. No one, however, capable of appreciating the doctor's labours, can doubt that they might properly have entitled him to retain this preferment ; ſtill a conduct, ſo ſignally diſintereſted, deſerves to be recorded and celebrated. He died at Oxford on the 18th of September 1783, at the age of ſixty-five. At the time of his death he was employed in preparing for the preſs "Remarks on ſelect Paſſages in the Old Teſtament," which were publiſhed as a poſthumous work, accompanied by eight ſermons, partly critical and partly practical. In private life, Dr. Kennicott ſuſtained the character of a liberal, worthy, and friendly man ; in company he appeared unaffected, good tempered, and cheerful. Encyc. Brit. Monthly Review, and New Ann. Regiſter. For a particular account of Dr. Kennicott's laudable undertaking, ſee the article *Hebrew* Bibles.

KENNINGTON, in *Geography*, an extenſive and populous hamlet, annexed to the pariſh of Lambeth, Surry, England. The manor formerly belonged to the duchy of Cornwall, and was provided with a palace, which was occaſionally occupied by Edward the Black prince, and Henries IV., VI, and VII. On a common or open piece of ground the convicted felons of Surry were formerly executed : around this ſpot ſeveral rows of houſes and ſtreets have been recently built : and Kennington may now be conſidered as conſtituting a part of the Britiſh metropolis. Lyſons's Environs of London.

KENNIS, in *Biography*, a performer on the violin, with an uncommon power of execution. See Louvain and Carillons.

KENNOMICK, Great, in *Geography*, a navigable river of America, in the N.W. territory, which empties itſelf into the S. end of the lake Michigan, N. lat. 42° 14'. W. long. 86° 52'. The waters of this river communicate, by a portage of 30 yards, with Little Kennomick, a ſhort river which runs north-eaſterly into this lake.

KENPOU, a river of Thibet, which runs into the Sanpoo, in the kingdom of Ava.

KENRICK, William, in *Biography*, the ſon of a citizen of London, was brought up to a mechanical employment, which he ſoon abandoned, and devoted himſelf to the cultivation of letters, by which he ſupported himſelf during the remainder of life. He was ſome time a ſtudent at Leyden, and, upon his return to England, he appeared as a poet, in "Epiſtles Philoſophical and Moral." He wrote an avowed defence of infidelity while in priſon for debt, and with a declaration, that he was leſs ambitious of the character of a poet than of a philoſopher. He was for a conſiderable time a writer in the Monthly Review, but having a diſagreement with Mr. Griffiths he began a new review of his own. He publiſhed, in a few days after the appearance of Dr. Johnſon's edition of Shakſpeare, a review of it, "in which the ignorance or inattention of that editor is expoſed, and the poet defended from the perſecution of his commentators, 1765." In the year 1766, he produced a comedy, entitled "Falſtaff's Wedding," at firſt intended to have been given to the public as an original play of Shakſpeare, retrieved from obſcurity ; and it was admitted to be a tolerably good imitation of the great maſter of drama. Mr. Kenrick was continually involved in diſputes, many of which were not creditable to his character. He tranſlated the Emilius and Eloiſa of Rouſſeau, and Millot's Elements of the Hiſtory of

England. He was likewiſe the author of ſeveral dramatic performances, and other miſcellaneous pieces. He was, in 1774, the editor of "The Poetical Works of Mr. Robert Lloyd," in two vols. 8vo. He died in the month of June 1777. Encyc. Brit.

KENSINGTON, in *Geography*, a pleaſant and populous village in the hundred of Oſſulſton, England, is about one mile and a half W. of Hyde-park Corner, and conſiſted, in 1800, of 1433 houſes, which were occupied by 8556 inhabitants. This place is chiefly noted for its royal palace, which was firſt appropriated to the crown by king William III. who built a houſe here; but that and the gardens have been much altered and improved by ſucceeding monarchs. The gardens are of conſiderable extent, and are laid out in gravel walks, plantations, &c. This is a favourite place of reſort and exerciſe for the inhabitants of London, particularly during the fine weather in ſummer. They are nearly four miles in circumference, and are ſeparated, on the eaſtern ſide, from Hyde-park by a low wall. Through theſe gardens flows a ſmall ſtream, which is made to fill a canal within the incloſure, and another much larger, called the Serpentine river, in Hyde-park. The palace is a large irregular edifice, built at various periods, without harmony of deſign or beauty of architecture. Its ſtate rooms conſiſt of a ſuit of 12 apartments, which contain ſeveral valuable and curious paintings by artiſts of eminence. The names of ſome of theſe are publiſhed in Lyſons's Environs of London; and more fully in "The Ambulator," 12mo. 1810. Beſides ſeveral elegant villas in this pariſh, is a fine ancient manſion called Holland Houſe, the ſeat and property of lord Holland, for a view and account of which, ſee Architectural Antiquities of Great Britain, vol. ii.

Kensington, a townſhip of America, in Rockingham county, New Hampſhire, about ſix miles S. of Exeter, and eight N. of Newbury port. It was incorporated in 1737, and contains 776 inhabitants.

KENT, a maritime county of England, forms the ſouth-eaſtern extremity of this iſland, and is bounded on the weſt by Surry, on the north by the German ocean and the river Thames, which ſeparates it from Eſſex, on the eaſt by the Downs and the ſtraits of Dover, and on the ſouth by Suſſex, and part of the ſame ſtraits. The medium length of the diſtrict, thus encompaſſed, from eaſt to weſt, is 66 miles, and its breadth about 26, whilſt the circumference is nearly 174 miles Its area, according to Boys's Agricultural View, is about 832,000 acres.

Kent is primarily divided into five large diſtricts, called *Laths*, *viz.* Sutton at Hone, Aylesford, Scray, Shipway, and St. Auguſtine. Theſe are ſubdivided into bailiwicks, hundreds, and liberties. The whole county contains fourteen bailiwicks, ſixty-three hundreds, fifteen franchiſes or liberties, the two cities of Canterbury and Rocheſter, and thirty-four market towns, though in ſome of theſe the market is diſcontinued. The number of houſes, according to the returns under the population act of 1800, amounted to 52,998; that of inhabitants to 307,624; of whom 151,374 were males, and 156,250 females. For local purpoſes, the county is nearly equally divided into Eaſt and Weſt Kent, the former contains the laths of Sutton at Hone, Aylesford, and the ſouthern part of Scray; the latter the northern part of the lath of Scray, and thoſe of Shipway and St. Auguſtine. In each of theſe great diſtricts, a court of ſeſſion is held four times every year; twice originally and twice by adjournment: thoſe for the eaſtern diviſion at Canterbury, for the weſtern at Maidſtone. The juſtices, though appointed for the whole county, generally confine their attention to that diſtrict in which they reſide. The county town is Maidſtone, where the aſſizes are held, and the knights of the ſhire are elected. Kent returns eighteen members to parliament; *viz.* two for the county, and two each for Canterbury, Rocheſter, Maidſtone, Queenborough, Dover, Sandwich, Romney, and Hithe. The four laſt are reckoned among the Cinque Ports. The eccleſiaſtical juriſdiction is divided between the archbiſhopric of Canterbury and the biſhopric of Rocheſter; the former having eleven deaneries, containing 281 pariſhes; the latter four deaneries, containing 132 pariſhes.

Ancient Hiſtory.—This diſtrict is peculiarly intereſting to the antiquary, not only from the numerous veſtiges of caſtles, abbeys, and old churches ſtill remaining, but from its proximity to the continent. Many authors contend, that it formerly joined the main land, by means of an iſthmus; and adduce plauſible arguments in ſupport of ſuch hypotheſis. Strabo, Cæſar, Ptolemy, and ſome other ancient writers, call this diſtrict Cantium; which word the Saxons altered to Cant-guar-Cantd. In the Domeſday Survey it is written Chenth. All the tranſactions relating to Cæſar's invaſion of Britain occurred in this county; for on this coaſt he made two deſcents, the 1ſt, fifty-five years before the birth of Chriſt, and the 2d, in the following year. At this time Kent was governed by four Britiſh kings; who collected not only their own ſubjects, but a vaſt concourſe of armed men from the neighbouring ſtates, to oppoſe and repel the invading Romans. Their efforts and bravery were unavailing, and the foreign warriors ultimately compelled the Britons to pay an annual tribute. In the year A.D. 43, a third deſcent was made on this coaſt by Aulus Plautius, who, being afterwards joined by Claudius, effected a conqueſt over the Britons. Kent was now included in that diviſion of Britain called Britannia-Prima; and was governed by Roman laws and Roman officers. Several permanent ſtations and temporary encampments were eſtabliſhed in this county; and military roads were formed. Among the latter was the Watling ſtreet, which extended from Dover, Dubris, to London, Londinium. On its courſe were the other Roman ſtations of Durovernum, at Canterbury, Durolevum, Durobrivis, at Rocheſter, Vagniacæ and Noviomagus. Two other vicinal roads, at leaſt, were formed in this county; one from Durovernum to Regulbium, or Reculver, and the other from the firſt place to Rutupium, or Richborough. Another road, called Stone-way, extended from Canterbury to Limne, the Roman Portus Lemanis.

The firſt deſcent of our Saxon anceſtors was made in this county, A.D. 449, when Hengiſt and Horſa, with about 1500 men, landed at Ebbsfleet, in the Iſle of Thanet. After ſome battles with the Picts and Scots, Hengiſt was inveſted with the ſovereignty of Kent; but wiſhing to engroſs the whole iſland, he was involved in a war with the Britons, and ſeveral battles were fought within this county and on its confines. The Saxons, however, prevailed, and Kent continued a diſtinct kingdom for many reigns. In this county Chriſtianity was firſt eſtabliſhed in Britain. See St. Augustine, and Turner's Hiſtory of the Anglo-Saxons, 2 vols. 4to.

The preſent flouriſhing condition of Kent has partly originated from the peculiar cuſtom by which the deſcent of landed property is here regulated, and which is comprehended under the term *gavel-kind.* The cuſtoms are of very remote date, and prevailed throughout England till the Norman conqueſt. It is evident that at that period the eldeſt ſon did not inherit to the excluſion of his brethren: the right of ſole ſucceſſion, in preference to the diviſible practice of inheritance, was then introduced by the Conqueror, as a ſpecimen of the arbitrary dominion he intended to eſtabliſh. The men of Kent ſucceſsfully reſiſted the incroachment, and retained their ancient cuſtoms: while the other parts of the nation were gradually brought to acquieſce in the claim of primogeniture.

The law of gavel-kind comprehends the joint inheritance of all the ſons to the eſtate of the father; and ſhould the father ſurvive his ſons, the inheritance devolves to his grandſons, or to his daughters. The partibility of this cuſtom is not reſtrained to the direct line of conſanguinity; for all brothers may jointly inherit the eſtate of a deceaſed brother; and, agreeably to the ſame rule, nephews and nieces, by the right of repreſentation, are, in their degrees, intitled to the ſame diviſion of property. So predominant is gavel-kind in Kent, that all lands are preſumed to be ſubject to that uſage, till the contrary is proved; and formerly, ſuch lands only were exempted from it, as were holden by knight's ſervice. See GAVEL-KIND.

The general aſpect of Kent is very beautiful; ariſing from the inequality of the ſurface, the diverſity of the ſcenery, and the variety in the verdure. "The whole county," Mr. Haſted obſerves, "excepting the marſhes and the Weald, is a general cluſter of ſmall hills; two chains of which, higher than the reſt, run through the middle of Kent, from weſt to eaſt, in general at about eight miles diſtance from each other, (though at ſome places much leſs,) and extending from Surrey to the ſea." Theſe are called the Upper and Lower Hills, and are moſtly covered with coppice and woodlands. The northern range, and, indeed the whole north ſide of the county, is compoſed principally of chalk and flints, as well as a large tract on the eaſtern coaſt: the ſouthern range is chiefly of iron-ſtone and rag-ſtone: to the weſtward, clay and gravel prevail on the eminences.

Mr. Boys, in the Agricultural Survey of this county, has divided it into eight diſtricts, according to the nature of the ſoil and produce: theſe reſpectively comprehend the Iſle of Thanet; the upland farms of Eaſt Kent; the rich flat lands in the vicinity of Faverſham, Sandwich, and Deal; the hop-grounds, &c. of Canterbury and Maidſtone; the Iſle of Sheppey; the upland farms of Weſt Kent: the Weald of Kent; and Romney Marſh. The Iſle of Thanet forms the north-eaſtern angle of Kent, from the main land of which it is ſeparated by the river Stour and the water called the Nethergong: its length is about nine miles, and its breadth about five. This diſtrict is in a very high ſtate of cultivation, and of very remarkable fertility; its ſoil, though originally a light mould on a chalky bottom, having been greatly improved by the inexhauſtible ſtore of manure ſupplied by the ſea. The whole iſle contains about 3500 acres of excellent marſh land, and 23,000 acres of arable; thoſe of the latter, which border on the marſhes, are the moſt productive; though even the uplands are rendered extremely fertile by the excellent modes of cultivation. The general routine of crops on the lighter ſoils is fallow, barley, clover, and wheat; but a crop of peas is occaſionally introduced inſtead of the fallow; and ſometimes beans in the place of the clover. Where the round-tilth courſe is purſued in the rich ſandy loam lands, the general routine is beans, wheat, and barley. Canary-ſeeds are likewiſe grown here in great quantities, as well as radiſh, ſpinach, muſtard, cabbage, and other eſculent plants for the London markets. The marſh lands are principally applied to the fattening of ſheep and cattle. The upland farms of Eaſt Kent may be deſcribed as including an open and dry tract of land, lying between the city of Canterbury, and the towns of Dover and Deal; and another tract, incloſed with woods and coppice, extending from Dover, by Elcham and Aſhford, to Rocheſter, in length; and from the iſle of Sheppey to Lenham, &c. in breadth. The former tract includes a great variety of ſoils, ſcarcely thoſe of any two farms being ſimilar. Stiff clays are principally met with on the tops of the higheſt hills about Dover; flinty tracts occur in the vallies in the ſame neighbourhood, and about Stockbury near Maidſtone. The woodlands in Eaſt Kent are diſperſed chiefly between the great road from Rocheſter to Dover, and the chalk hill that runs from Folkſtone, by Charing to Detling. Theſe furniſh the adjacent country with fire-wood, and the dock-yards with timber for ſhip-building; but the moſt material part of their produce, is the immenſe quantity of hop-poles cut out for the neighbouring plantations. The wood is generally cut at from ten to fourteen years growth, and its value is eſtimated by the quantity of hop-poles produced. The rich flat lands in the vicinity of Faverſham, Sandwich, and Deal, lie nearly on a level, are extremely fertile, and excellently managed under a general ſyſtem. They are almoſt entirely arable; the ſoils are a rich ſandy loam, intermixed with ſand, and a ſtiff wet clay. In the vicinity of Sandwich are many orchards, which in ſome years produce large quantities of good apples, the greater part of which is conveyed by the coal veſſels to Sunderland and Newcaſtle. The hop-grounds, extending from Maidſtone and Canterbury to Sandwich, are very productive, and under a good ſyſtem of management; though the ſoils are different, as well as the kind of hops cultivated. The plantations have of late years been greatly increaſed, particularly in thoſe parts contiguous to Maidſtone, Faverſham, and Canterbury; the plantations called the City Grounds, extend through a circuit of two miles and a half round Canterbury, and are eſtimated to include from 2500 to 3000 acres. The hops grown here, and in the grounds running hence to Sandwich, are very rich in quality, and in much requeſt for their great ſtrength; if well managed, they are alſo of a good colour. Thoſe grounds are found moſt productive, which have a deep rich loamy ſurface, with a ſub-ſoil of deep loamy brick earth; and this kind of land forms the principal part of the plantations of Eaſt Kent; though there are ſome good grounds where the ſurface is very flinty. The produce is ſubject to great fluctuation; in ſome years amounting to fourteen or fifteen hundred weight per acre; in others not exceeding two hundred. In drying hops, a ſmall quantity of brimſtone is ſometimes uſed, in order to ſuffocate the inſects, and occaſion a more ſpeedy evaporation of the ſuperfluous moiſture: by the uſe of the ſulphur, the hops are thought alſo to be improved in colour. In the plantations of Maidſtone, and its vicinity, very great crops of hops are grown; but they are inferior in quality to thoſe of Canterbury and Eaſt Kent. The ſoil is what is locally termed ſtone ſhatter; that is, where there is a mixture of ſmall pieces of ſtone and ſand: the ſub-ſoil is called Kentiſh rag, and burns into good lime. The hop plantations afford employment to great numbers of the poorer claſſes, not only of this, but of other counties; and the motley groups that aſſemble to aſſiſt in hop-picking are truly amuſing. Hops are generally regarded as having been introduced into this country about the time of Henry VI.; and in the year 1428, they were petitioned againſt as *wicked weed*. This, however, can only refer to the uſe of them, for they are found wild in almoſt every part of Britain. They came into more general uſe in the reigns of Henry VIII. and Elizabeth. Nearly one-fourth of the whole produce of the hop-duty in England, is paid from the plantations of Eaſt Kent. Beſides the hop-grounds, the neighbourhood of Maidſtone is celebrated for apples, cherries, and filberts; many ſmall fields, of from one to fifteen acres, being planted with different ſpecies of theſe kinds of fruit; it is alſo a common practice to plant hops, apples, cherries, and filberts, all together. The apples intended for cyder, are generally gathered towards the end of October, and after being laid in heaps to ripen, under cover, are manufactured for uſe.

In plentiful years the cyder fruit ſells for fourteen-pence per buſhel. The apples appropriated for domeſtic uſes are ſold to the fruiterers, who ſend them to London by the hoys, or to the north of England by the coal veſſels. The cherries, which are of the white and black heart, Hertfordſhire-black, red, and Flemiſh or Kentiſh kinds, are uſually ſold to higlers, who retail them on the ſea-coaſt by the ſieve or baſket, containing forty-eight pounds each; or elſe they are ſent by water to London, and conſigned to the fruit-factors. The filberts are moſtly diſpoſed of in the ſame manner. The Iſle of Sheppey is ſeparated from the reſt of Kent by an arm of the ſea, called the Swale, which is navigable for veſſels of 200 tons burthen. Its length is about eleven miles, and its breadth eight; four-fifths of it conſiſting of marſh and paſture lands; the remainder is arable. The prevailing ſoil is a deep, ſtrong, ſtiff clay, through which the plough can hardly be forced. The upland farms of Weſt Kent include a great variety of ſoils, and are cultivated under various ſyſtems of huſbandry. This diſtrict is more incloſed than the eaſtern part, and produces greater quantities of timber and underwood, particularly on the upper or weſternmoſt ſide. The waſte and common lands of this diſtrict form an extent of many thouſand acres. The turnpike roads are moſtly in good condition; but the croſs roads of Weſt Kent are frequently impaſſable for carriages. The Weald of Kent is a conſiderable and remarkable tract, ſtretching along the ſouth ſide of the county, from Romney Marſh, to Surry; on the north it is bounded by the range of hills which enter the county near Well-ſtreet, and extends, in nearly a due weſterly direction, to Sutton and Egerton, and thence ſouth-eaſtward to Hythe; on the ſouth it ſtretches to the confines of Suſſex, and includes the Iſle of Oxney. This diſtrict was in ancient times an immenſe wood or foreſt; wholly deſtitute of inhabitants, excepting ſwine and deer. By degrees, however, it became peopled, and is now every where interſperſed with towns and villages; though it ſtill contains ſome extenſive and flouriſhing woodlands. Its preſent name is Saxon, and ſignifies a woody country; but the Britons called it *Coit Andred*, the great chaſe or foreſt. The whole was a demeſne of the Saxon kings; and there are ſtill certain privileges annexed to the poſſeſſion of the lands, which induce the proprietors to contend for being within its limits. "It is ſaid," Mr. Haſted obſerves, "that within the Weald, the proof of woodlands having ever paid tythe, lies on the parſon, to enable him to take tythe of it, contrary to the uſual cuſtom in other places, where the proof of exemption lies on the owner; nor are the lands in it ſubject to the ſtatute of woods; nor has the lord waſte within the Weald; the timber growing thereon belongs to the tenant. This latter cuſtom of excluding the lord from the waſte, is called *land-peerage*." The Weald, when viewed from the adjoining hills, which command the whole extent, exhibits a moſt delightful landſcape, interſperſed with ſmall eminences, highly cultivated, and animated by farm-houſes, ſeats, and villages, promiſcuouſly ſcattered among towering oaks and other trees. Romney Marſh is an extenſive level tract of rich marſh land lying on the ſouthern coaſt, and comprehending, in itſelf, about 23,925 acres; but when deſcribed, as it frequently is, in connection with Walland Marſh, which adjoins it on the ſouth-weſt, and Denge Marſh, which connects with the latter on the ſouth-eaſt, it includes about 43,326 acres; Walland Marſh containing 16,489, and Denge Marſh 2912. The whole level, however, is yet more extenſive; for Guildford Marſh, which adjoins Walland Marſh on the weſt, comprizes 3265 acres; moſt of this latter tract is in Suſſex. The beautiful appearance of theſe levels in the ſummer ſeaſon, when the entire ſurface is clothed with luxuriant verdure, and covered with numerous flocks of ſheep and droves of cattle, cannot fail to excite conſiderable intereſt in every obſerver. The Marſh is defended againſt the violence of the ſea by an immenſe bank of earth, of great ſtrength, called Dimchurch-Wall, which extends above three miles in length. This wall is the ſole barrier that prevents the ſea from overflowing the whole extent of the level; and as it is for the general ſafety, ſo "is it ſupported," ſays Haſted, "as well as the three grand ſluices through it, which are for the general drainage of the marſhes, by ſcots levied over the whole of it; but the interior drainage, which is portioned out into a number of diviſions, called waterings, is provided with ſewers, and maintained at the expence of the reſpective land-holders, by a ſcot raiſed ſeparately on each" in proportion to their own watering. In that portion of the Marſhes within this county, are comprehended the two corporate towns of New Romney and Lydd, and ſixteen other pariſhes. The incloſures are principally formed by ditches and a rail fence. The ſoil of theſe ſpacious levels has been almoſt wholly depoſited by the ſea, and conſiſts principally of a fine, ſoft, rich, loam and clay, with a greater or leſs proportion of ſea-ſand intermixed. The ſub-ſoil conſiſts of alternate layers of ſand and clay, with ſea-beach occaſionally intervening. In many places throughout the Marſh, at the depth of three or four feet, have been frequently dug up oak leaves, acorns, &c. together with large trees lying in different directions; ſome acroſs each other; ſome appearing with the roots to them, as if overturned by a ſtorm, or other convulſion of nature; and others as if cut down with an axe or ſharp inſtrument; the colour being as black, and the wood as hard, as ebony. Theſe marſhes are almoſt entirely appropriated to the grazing and fattening of ſheep and cattle, but chiefly to the former, which are bred and fed here in immenſe quantities; their number, perhaps, exceeding that of any other diſtrict in the kingdom. Romney Marſh has generally been conſidered as unhealthy; and probably this opinion has operated to keep it thinly peopled. Of late, however, its ſanative qualities have been greatly improved; a change attributed to the attention that has been given to keep the ditches free from ſtagnant and putrid water. The extent and rental of farms in Kent are uncommonly various, as muſt be evident when the peculiar cuſtoms of the county are conſidered in connection with the diverſities of the ſoils and ſurface. The number of freeholds in the county is ſtated, by Mr. Haſted, at about 9000; independent of the large eſtates of the churches of Canterbury and Rocheſter, and of various corporate bodies. The copyhold and cuſtomary tenants are very few. The general diſtribution of the freeholds, and their cloſe intermixture with each other, occaſion a very frequent intercourſe between the gentry and the yeomen, and thus generate that equality of ſentiment ſo favourable to the intereſts of individual right.

The manufactures carried on in Kent are various, though not particularly extenſive. The clothing trade, which once gave employment to great numbers of its inhabitants, is now nearly forgotten in the county. At Canterbury, muſlins, brocaded ſilks, and ſtockings, are made; at Deptford and Whitſtable are large copperas works; at Stoner, in the Iſle of Thanet, and likewiſe in the Iſle of Graine, ſalt is manufactured; at Oſpringe is an extenſive manufactory for gunpowder, erected by government; and there is alſo another near Dartford; in the Weald, bordering on Suſſex, are various iron furnaces; and at Dartford and Crayford are mills for the manufacturing of iron; at the latter place alſo, are extenſive works for the printing of calicoes, and ſpacious grounds for the bleaching of linens; at Seven Oaks are large ſilk mills; and at Boxley, near Maidſtone, is the moſt extenſive and curious manufacture of paper, perhaps, in Europe; paper is alſo made in the vicinity of Dartford, and ſome other places. The various dock-yards at Deptford, Woolwich, Chatham, &c. provide employment for numerous artizans in all the different branches of naval affairs; ſhip-building is alſo carried on at other places on the ſea-coaſt.

The religious houſes, or monaſtic eſtabliſhments, in Kent, were formerly very numerous, and their net annual income, at the periods of their diſſolution, amounted to 9000*l.* Among them were two abbies, three priories, and five nunneries, of the Benedictine order; one priory of the Cluniac; one abbey of the Ciſtercian; of ſecular canons, five colleges; of regular canons, four abbies and five priories, one of which was Premonſtratenſian: of friars, there was one priory and one nunnery of Dominicans; two priories of Franciſcans, one priory of Trinitarians, three priories of Carmelites, and four alien priories: there were alſo two commanderies of knights hoſpitallers of St. John of Jeruſalem; and fifteen hoſpitals; beſides various hermitages, chantries, and free chapels.

The number of caſtles that have been erected in Kent is very conſiderable; and many of them yet remain, in different degrees, almoſt perfect. Of theſe, the immenſe fortreſs of Dover is the principal; and this is now garriſoned with a ſtrong force, as are alſo ſeveral others on the ſea-coaſt; but moſt of the caſtles in the interior of the county are diſmantled and mouldering into ruins.

The principal rivers that interſect or bound this county are the Thames, the Medway, the Greater and Leſſer Stoure, the Rother, the Darent, the Cray, and the Ravenſborne. The Thames, the Tameſis of Cæſar, which has a very important influence on the trade and commerce of this county, will be fully deſcribed in its place. (See Thames.) The Medway, which is more peculiarly a Kentiſh river, was called Vaga by the Britons, a name deſcriptive of its very ſinuous courſe and mazy wanderings. The Saxons changed this appellation to Medweg and Medwege, of which the preſent name is a corruption. This river has four principal ſources, of which only one is in this county; two being in Suſſex, and the other in Surry. That branch which enters Kent from Surry, riſes in Blechingley pariſh, and having been joined by ſeveral rills, flows on to Eaton bridge, Hever caſtle, and Penſhurſt, near which it receives one of the branches that riſe in Suſſex, and proceeds to Tunbridge. A little above this town the river ſeparates into ſeveral channels, one of which is navigable and is again joined by the other diviſion about two miles below Tunbridge. At Yalding it receives the united waters of the other two principal branches, and flows in a winding direction to Maidſtone, and gradually augmenting in depth and breadth, purſues its pictureſque courſe to Rocheſter, where the ſcenery is peculiarly beautiful. Proceeding hence towards Sheerneſs, it paſſes Chatham, Upnor Caſtle, and Gillingham Fort, and flows onward to the Thames, which it enters between the Iſles of Graine and Sheppey, having firſt united its waters to thoſe of the Swale. The Medway, with its numerous tributary ſtreams, is calculated to overſpread a ſurface of nearly thirty ſquare miles in the very midſt of Kent. The tide flows almoſt as high as Maidſtone; but at Rocheſter bridge it is exceedingly ſtrong and rapid; and below that, all the way to Sheerneſs, a diſtance of about twenty miles, the bed of the river is ſo deep, and the reaches ſo convenient, that many of the largeſt line of battle ſhips are moored here, when out of commiſſion, as in a wet dock, and ride as ſafely as in any harbour in Great Britain. The Medway was firſt made navigable to Tunbridge about the middle of the laſt century, under the proviſions of an act of parliament paſſed in the year 1740; though an act had been procured for the purpoſe in the reign of Charles II. The Greater Stoure has two principal branches, both of which riſe in this county; the firſt at Well-ſtreet near Lenham; the other among the hills between Liminge and Poſtling. Theſe ſtreams unite near Aſhford; whence the Stoure proceeds to Canterbury, through which it flows in a divided ſtream, and again unites a little below that city. The Leſſer Stoure riſes in the vicinity of Liminge, and directing its courſe northward, has its waters increaſed by ſeveral ſmall rills, and ſometimes by a temporary water called the Nailbourn, which, after continued rains or ſudden thaws, iſſues from ſeveral ſprings and forms a ſtrong current. The Rother, formerly called the Limene, riſes at Gravel-hill, in the pariſh of Rotherfield, in Suſſex, and flowing eaſtward becomes the boundary of this county below Sandhurſt and Newenden. The Darent riſes on the borders of this county and Suſſex, near Weſterham, whence flowing to the north-eaſt, it paſſes on to Riverhead, where it turns to the north, and flows in that direction to South Darent. The Cray, and the Ravenſbourne, are only ſmall ſtreams; the former has its ſource at Newell, in Oppington pariſh, the latter riſes on Keſton Downs, near an ancient Roman encampment. Haſted's Hiſtory and Antiquities of Kent, 12 vols. 8vo. Beauties of England and Wales, vol. vii. 1806.

Kent, a county of America, in Maryland, on the eaſt ſhore of Cheſapeak bay, bounded E. by Newcaſtle, and part of Kent county, Delaware, and W. by Cheſapeak bay: about 32 miles long. and 13 broad; containing 11,771 inhabitants, including 4474 ſlaves. Its chief town is Cheſter.

Kent *County*, in Upper Canada, extends northward to the boundary line of Hudſon's bay, including the whole territory to the weſtward and ſouthward of that line, to the utmoſt extent of the country known by the name of Canada. —Alſo, a county of Rhode iſland, lying S. of Providence county, on the W. ſide of Narraganſet bay; 20 miles long and 10 broad; divided into four townſhips, and containing 8487 inhabitants.—Alſo, the middle one of the three counties of Delaware; 40 miles from N. to S. and 26 from E. to W.; containing 10,544 inhabitants, including 1485 ſlaves. The lands in this county are eſteemed the richeſt in the ſtate. It is well watered by ſeveral ſmall ſtreams that empty themſelves into the Delaware. The chief town is Dover.—Alſo, an iſland in Queen Ann's county, Maryland, and the largeſt in Cheſapeak bay; 12 miles from N. to S. and ſix broad. It has a poſt-office.—Alſo, a townſhip in Litchfield county, Connecticut, bordering on the ſtate of New York, and 8 or 10 miles W. of Litchfield; containing 1607 inhabitants.

KENTAISSE, a ridge of mountains of Thibet, between the heads of the Ganges and the Sanpoo rivers. N. lat. 30° 40′. E. long. 80° 49′.

KENTHI, a town of Poland, in the palatinate of Cracow; 30 miles S.W. of Cracow.

KENTSHIAN, a mountain of Thibet; 3 miles E. of Sarangpour.

KENTUCKY, a crooked river of America, which riſes in the ſtate of the ſame name, and after a general N.W. courſe of 200 miles, falls into the Ohio, N. lat. 38° 35′. W. long. 85° 30′. It is ſometimes called "Cattawa." Its ſource is in the Laurel mountains, and it interlocks with Licking river. Its mouth, which is 250 yards wide, is 77 miles above the Rapids, and 626 below Pittſburg. The river is navigable 130 miles, though its current is rapid, the banks being high and rocky. It is ſaid that black-lead mines have been found on the head waters of this river. Little Kentucky river is 25 yards wide, and 3 miles W. of Kentucky river.

Kentucky, one of the United States of America, bounded N.W. by the river Ohio, W. by Cumberland river, S. by Teneſſee ſtate, E. by Sandy river, and a line drawn due S. from its ſource, till it ſtrikes the northern boundary of Teneſſee. It lies between 36° 30′ and 39° 30′ N. lat., and between 81° and 89° W. long., is about 250 miles long, and 200 broad; and contains 50,000 ſquare miles. It was well known to the Indian traders many years before its ſettlement: a map of it was made from their deſcription in 1752; and it was farther explored in 1754 and 1769. But it was firſt ſettled by Col. Daniel Boon in 1773; erected into an independent ſtate by act of Congreſs, in December 1790; and received into the Union in June 1792. Kentucky, which was originally divided into two counties, Lincoln and Jefferſon, has been ſince ſubdivided into 42, as in the following table.

Counties.	No. of In. in 1800.	No. of Slaves in 1800.	Chief Towns.	No. In.
Fayette	12,233	3,786	Lexington	1,795
Jeſſamine	5,438	1,553	Nicholasville	23
Woodford	6,452	2,058	Verſailles	172
Scott	7,659	1,787	Georgetown	348
Maſon	11,405	1,603	Waſhington	570
Bracken	2,382	191	Auguſta	143
Harriſon	4,263	393	Cinthiana	87
Pendleton	1,573	239	Falmouth	40
Clerk	7,523	1,535	Wincheſter	130
Montgomery	6,999	749	Mount Sterling	83
Fleming	4,893	240	Flemingſburg	123
Floyd	472	29	Preſtonſbury	6
Franklin	4,450	1,109	Frankfort	628
Gallatin	1,078	276	Port William	213
Boone	1,534	325		
Campbell	1,797	258	Newport	106
Henry	3,258	406		
Nicholas	2,863	322	Newtown	62
Bourbon	12,356	1,994	Paris	377
Mercer	9,242	2,169	Danville	280
Garrard	6,083	1,234	Lancaſter	103
Nelſon	9,087	1,735	Beardſton	579
Bullit	3,446	944	Shepherdsville	96
Green	6,025	816	Greenſburg	71
Cumberland		236		
Shelby	8,929	1,409	Shelbyville	262
Jefferſon	8,395	2,330	Louiſville	359
Lincoln	8,555	1,750	Stanford	66
Harden	3,597	310	Elizabethtown	56
Breckenridge	758	38	Hardenſburg	49
Ohio	1,121	122	Hartford	73
Polaſki	3,361	232		
Knox	1,119	62		
Henderſon	1,263	340	Henderſon	205
Livingſton	2,787	444	Eddyville	69
Chriſtian	2,318	297		
Logan	5,690	730	Ruſſelville	127
Warren	4,645	417	Bowling-Green	41
Muhlenburg	1,517	116	Greenville	26
Barren	4,784	505		
Waſhington	8,887	1,382	Springfield	163
Madiſon	10,380	1,688	Richmond	110
Total 42	220,959	40,343		
Total 1790	73,677	12,430		
Increaſe in 10 years	147,282	27,913		

In January 1799, the legiſlature paſſed an act, apportioning repreſentation, and diſtributing the ſtate into ſenatorial diſtricts. This act provides, that the houſe of repreſentatives ſhall be compoſed of 62 members, elected from the ſeveral counties, according to the ratio of one for every 500 qualified electors, and that the ſenatorial branch of the legiſlature ſhall conſiſt of 24 members.

The whole extent of the north-weſtern ſide of Kentucky is waſhed by the river Ohio; the principal branches of which, that ſerve to water this fertile tract of country, are Sandy, Licking, Kentucky, Salt, Green, Teneſſee, and Cumberland rivers. Theſe again branch out into rivulets and ſtreams, which, purſuing different directions, ſerve to fertilize the whole country. In the dry ſeaſon, however, many of them diſappear, and the inhabitants are diſtreſſed for want of water. At the bottoms of theſe water-courſes, the lime-ſtone rock, which is common in this country, appears of a greyiſh colour; but where it is expoſed to the air, in its natural ſtate, it appears like brown free-ſtone. On the banks of theſe ſtreams the ſtone has the appearance of fine marble, being of the ſame texture, and found in great plenty. In this country there are five noted ſalt-ſprings or licks, which ſupply abundance of ſalt for uſe and exportation. The whole country lies upon a bed of lime-ſtone, generally about ſix feet below the ſurface, except in the vallies, where the ſoil is much thinner. A tract, about 20 miles wide, along the banks of the Ohio, is hilly, broken land, interſperſed with many fertile ſpots. The reſt of the country is agreeably uneven, formed of gentle aſcents and deſcents. The vallies are commonly narrow, and the ſoil thin and inferior in quality; and that along the aſcending ground is frequently not much better; though it is ſufficiently deep for vegetation, as the ſize of the trees indicates. The ſoil is either black, or tinged with a brighter or deeper vermilion, or is of the colour of dark aſhes. In many places there are appearances of potter's clay, and of coal in abundance. Although this country is generally hilly or mountainous, and in many parts barren, it has various plains and ſtrips of land fit for paſturage and the rearing of cattle; and a project has been accompliſhed of cutting a road through the moſt mountainous part from Kentucky, to paſs by the ſweet ſprings in Virginia, and thence to Wincheſter, by which a ſaving is made of 200 miles in diſtance from the one to the other. This country is well timbered. Of trees of the natural growth of the country we may reckon the elm, the beech, the aſh, the juniper, the ſugar, the coffee, the papaw, the hackberry, and the cucumber. The two laſt are ſoft wood, and bear a fruit of the ſize and ſhape of the cucumber. The coffee tree reſembles the black oak, and bears a pod, that incloſes a ſeed, of which is prepared a liquor not unlike coffee. Beſide theſe there is the honey-locuſt, the black mulberry, and wild cherry, of a large ſize. The buck-eye, an excluſively ſoft wood, is the horſe cheſnut of Europe. The magnolia bears a beautiful bloſſom of a rich and exquiſite fragrance. Such are the variety and beauty of the flowering ſhrubs and plants, which grow ſpontaneouſly in this country, that in the proper ſeaſon the wilderneſs appears in bloſſom. The accounts that have been given of the fertility of the ſoil in this country have, in ſome inſtances, exceeded belief, and probably have been exaggerated. However, it is allowed that ſome parts of Kentucky, particularly the high grounds, are remarkably good. The lands of the firſt rate, it is ſaid, are too rich for wheat, and will produce 50 or 60, and in ſome inſtances, 100 buſhels of good corn *per* acre. In common, the land will yield 30 buſhels of wheat or rye *per* acre. Barley, oats, flax, hemp, and vegetables of all kinds, common in this climate, yield an abundant increaſe. Cotton is ſeldom, and with difficulty brought to perfection. Iriſh potatoes thrive well; but ſweet potatoes are raiſed with difficulty. A ſpecies of rye was found by the firſt ſettlers growing wild in Kentucky, and on the lands near the Ohio. It had a bearded ear like the cultivated rye, the beard ſomewhat longer, and the grain leſs. The ſtaple commodities in this ſtate are wheat and tobacco; but as the circumſtances of diſtance from a market, and the difficulty of navigating the Miſſiſſippi, render them unprofitable to the cultivators, they are turning their attention to the raiſing of hemp, for which the ſoil is well adapted. The rivers abound with fiſh of various ſorts; and as ſwamps are rare in Kentucky, the reptiles which they produce, ſuch as ſnakes and frogs, &c. are not numerous. The honey-bee may be called a domeſtic inſect, as it is ſaid not to be found but in civilized countries. Accordingly, it is a common ſaying among the Indians, when they ſee a ſwarm of bees in the woods, "Well, brothers, it is time for us to decamp, for the white people are coming." The quadrupeds, except the buffalo, are the ſame as in Virginia and the Carolinas. The climate, if we except a few places in the vicinity of ponds and low grounds, is healthy and delightful. Their inhabitants do not experience the extremes of heat and cold. In 1798 the greateſt heat was 89° Fahrenheit. The weather in winter is fluctuating. Snow ſeldom falls deep or lies long. The winter begins about Chriſtmas, and is never longer than three months, commonly two, and is ſo mild that cattle can ſubſiſt without fodder. Fahrenheit's thermometer ſeldom falls below 35° in winter, nor riſes above 80° in ſummer. The approach of the ſeaſons is gradual; the ſummer continuing till the middle of October, the autumn or mild weather till Chriſtmas, and the ſpring appears to produce effect in March, and by the middle of April, the foliage of the foreſts is completely expanded. Kentucky has various minerals. A valuable lead mine has been diſcovered between Cumberland and Green rivers. Marle, chalk, gypſum, and ochres are found in different places. The country affords alſo iron, copper, ſulphur, nitre, copperas, alum, &c. From the caves on Green river earth is collected for ſalt-petre; and many of the inhabitants manufacture their own gun-powder. Iron-works are eſtabliſhed. Paper-mills, oil-mills, fulling-mills, ſaw-mills, and a great number of valuable griſt-mills, are erected. Several valuable tanneries have been eſtabliſhed in different parts of the country. Attempts are made, on a large ſcale, for the culture of vineyards, and the introduction of the cotton manufacture. The ſalt-works are more than ſufficient for the ſupply of all the inhabitants, at a low price. Conſiderable quantities of ſugar are made from the ſugar trees. The amount of exports from this ſtate, in 1801, was 626,673 dollars. Malt liquor, ſpirits diſtilled from corn and rye, and the juice of the ſugar-tree, mixed with water, conſtitute the ordinary beverage of the country. No preference is given to any one religious denomination in this country. The Preſbyterians, Baptiſts, and Methodiſts, are the moſt numerous. Among the natural curioſities of the country may be reckoned the banks of Kentucky and Dick's river. Here may be obſerved 3 or 400 feet of ſolid perpendicular rocks, in ſome parts of the lime-ſtone kind, or in others of fine white marble, curiouſly chequered with ſtrata of aſtoniſhing regularity; ſo that the rivers appear like deep artificial canals. Their high rocky banks are covered with red cedar groves. Caves have alſo been diſcovered in this country, ſeveral miles in length, under a fine lime-ſtone rock, ſupported by curious arches and pillars. Springs that emit ſulphureous matter have been found in ſeveral parts of the country. Near Lexington are found curious ſepulchres, full of human bones.

By the conſtitution of this ſtate, formed and adopted in 1792, the powers of government are divided into three diſtinct departments; legiſlative, executive, and judiciary. The legiſlative is veſted in a general aſſembly, conſiſting of a ſenate and houſe of repreſentatives (ſee the beginning of this article); the ſupreme executive in a governor; the judiciary in the ſupreme court of appeals, and ſuch inferior courts as the legiſlature may eſtabliſh. The repreſentatives are choſen annually by the people; the ſenators and governor are choſen for four years by electors appointed for that purpoſe; the judges are appointed during good behaviour, by the governor, with the advice of the ſenate. The declaration of rights aſſerts the civil equality of all; their right to alter the government at any time; liberty of conſcience; freedom of elections and of the preſs; trial by jury; the ſubordination of the military to the civil power; the rights of criminals to be heard in their own defence; the right of the people to petition for redreſs of grievances, to bear arms, and to emigrate from the ſtate. It prohibits unreaſonable ſearches and ſeizures; exceſſive bail; confinement of debtors, unleſs there be preſumption of fraud; ſuſpenſion of habeas corpus writ, unleſs in rebellion or invaſion; ex poſt facto laws; attainder by the legiſlature; ſtanding armies; titles of nobility, and hereditary diſtinctions. The legiſlature of Virginia, while Kentucky belonged to that ſtate, made proviſion for a college in it, and endowed it with very conſiderable landed funds. There has been ſince eſtabliſhed a college at Lexington, called "Tranſylvania," regularly organized and well endowed, having a fund of 14,000 acres of land. The officers of the univerſity are a preſident and two profeſſors, in the literary departments; three medical profeſſors, in the ſchool of medicine; and a profeſſor of law: a divinity profeſſorſhip has been alſo contemplated. The library, ſupplied chiefly by liberal gentlemen in England, amounts to near 3000 volumes; and the philoſophical apparatus is gradually enlarging. In Lexington there is alſo a circulating library of about 1000 volumes. Schools, in ſeveral towns, are liberally encouraged and ſupported. The diſtance from Philadelphia to Kentucky by land is from 7 to 800 miles; from Baltimore nearly 700; nearly 600 from Alexandria; and upwards of 500 from Richmond. Morſe.

KENTZINGEN, a town of Germany, in the Briſgau, about a mile from the eaſt ſide of the Rhine; 13 miles N.W. of Friburg.

KENYON, Lloyd, in *Biography*, was born at Gredington, in Flintſhire, in the year 1733. He was educated at Ruthin ſchool in Denbighſhire, after which he was articled to Mr. Tomlinſon, an attorney at Nantwich, in Cheſhire. When he had completed his clerkſhip, he entered himſelf a member of the ſociety of Lincoln's Inn, and was called to the bar in 1761. He now began to practiſe as a conveyancer, and ſoon obtained a high reputation as a ſound lawyer, which was the means of introducing him to notice in the chancery court. Still, however, he made no figure at the bar, till the trial of lord George Gordon, in 1780, gave him an opportunity for a full diſplay of his talents; and from this moment he was looked up to with reſpect by his brethren at the bar. In 1782, he was made attorney general, and chief juſtice of Cheſter; and, much about the ſame time, he was returned to parliament for Hindon in Wiltſhire. In 1784, he was appointed to the office of maſter of the Rolls; and on the reſignation of the earl of Manſfield in 1788, he was, by the zealous recommendation of lord Thurlow, raiſed to the office of chief juſtice of the king's bench, and ennobled with the title of baron Kenyon. He died at Bath in April 1802, leaving two ſons, George the preſent lord, and the honourable Thomas Kenyon. Gent. Mag.

KEOGANG, in *Geography*, the moſt weſterly of the branches or mouths of the river Ava, in Pegu, which runs into the ſea near Cape Negrais.

KEOWE, or Keowee, the name given in America to the Savannah river, above its conflux with the Tugulo, the weſt main branch.—Alſo, the ancient name of the populous town and territory of the Cherokee Indians, on the river of that name. The ſoil is fertile, and the adjacent heights might, with little expence, be rendered almoſt impregnable. The fruitful vale of Keowe is ſeven or eight miles in extent, terminated by a high ridge of hills, and opening again to an extent of ten or twelve miles down to Sinica, and in breadth one or two miles. This was once a thickly inhabited ſettlement, well cultivated and planted. To the feeble remains of the once potent Cherokees it now exhibits a different ſpectacle.

KEOZEE, a town of Birmah, on the Irawaddy; 15 miles N.E. of Pagahm. This town is ornamented with ſeveral neat temples.

KEPELDEE, a town of Hindooſtan, in the country of the Nayrs; 30 miles E. of Tellicherry.

KEPHER Kenna, a village of Paleſtine, ſaid to be the ancient "Cana," where our Saviour changed the water into wine.

KEPLER, John, in *Biography*, a celebrated aſtronomer and mathematician, born at Wiel, in the duchy of Wirtemberg, December 27th, 1571, was ſon of Henry Kepler, an officer in the army, who had ſerved his country with diſtinction, but who, by misfortunes, was reduced to low and narrow circumſtances. He gave his ſon the beſt education in his power, though the youth was ſubject to many difficulties, by being ſent to different places, and by being put under different maſters. His genius and avidity for knowledge animated him to ſurmount every obſtacle, and to make a very rapid proficiency. He was ſent to Tubingen to purſue his academic ſtudies, and was admitted to the degree of bachelor in 1588, and to that of maſter of philoſophy in 1591. He applied himſelf to mathematics and theology, and undertook the duties of the miniſtry for a ſhort time. But his inclination being decidedly in favour of mathematics, he reſolved to devote his whole time and ſtrength to the ſcience; and ſo high was his reputation, that in the year 1594 he was invited to Gratz, in Stiria, to fill the mathematical chair in the univerſity of that city. In the year 1596, he married a lady of a noble family; and in two years from this period he was driven from Gratz by perſecution, on account of his religious principles; though he was ſoon recalled by the ſtates of Stiria: but not thinking himſelf ſafe, he accepted a preſſing invitation from Tycho Brahe to ſettle in Bohemia, and removed thither with his family and books in the year 1600. Upon a cloſe intimacy, Kepler was diſſatiſfied with the conduct of Tycho, and complained of his unwillingneſs as well to promote his intereſt, as to communicate to him all his diſcoveries and improvements. Tycho, however, died in 1601; but previouſly to this, he introduced him to the acquaintance of the emperor Rodolph, who gave him a favourable reception, and appointed him his mathematician. This title of mathematician to his imperial majeſty Kepler poſſeſſed during the remainder of his life, not only under the reign of Rodolph, but under his ſucceſſors, Matthias and Ferdinand. Upon the death of Tycho, the emperor Rodolph ordered him to complete the tables begun by that great man, which were to be called the "Rodolphine Tables." Theſe, notwithſtanding the vigour with which he applied himſelf to them, were, owing to unexpected difficulties, not completed and publiſhed till the year 1627. Having completed that work, he obtained the emperor's leave to go and reſide at Sagan, in Sileſia, where he ſuffered much inconvenience from not having his penſion regularly paid him. This circumſtance obliged him to take a journey to Ratiſbon in 1630, to ſolicit for the arrears due. Here he died in November, at the age of 59 years. The account of the labours and diſcoveries of this great man has been given by Mr. Maclaurin, in his work on the "Diſcoveries of Sir Iſaac Newton," and from that we ſhall extract the following ſketch. "To Kepler," ſays he, "we owe the diſcovery of the true figure of the orbits, and the proportions of the motions of the ſolar ſyſtem. This aſtronomer had a particular paſſion for finding analogies and harmonies in nature, after the manner of the Pythagoreans and Platoniſts. Three things, he tells us, he anxiouſly ſought after from his early youth:—Why the planets were ſix in number? Why the dimenſions of their orbits were ſuch as Copernicus had deſcribed from obſervations? And, what was the analogy or law of their revolutions? He ſought for the reaſons of the firſt two of theſe in the properties of numbers and plane figures, without ſucceſs. But at length reflecting that while the plane regular figures may be infinite in number, the regular ſolids are only five, he imagined that certain myſteries in nature might correſpond with this limitation inherent in the eſſences of things: he therefore endeavoured to find ſome relation between the dimenſions of thoſe ſolids and the intervals of the planetary ſpheres; and imagining that a cube inſcribed in the ſphere of Saturn would touch by its ſix planes the ſphere of Jupiter, and that the other four regular ſolids in like manner fitted the intervals that are between the ſpheres of the other planets; he became perſuaded that this was the true reaſon why the primary planets were preciſely ſix in number, and that the author of the world had determined their diſtances from the ſun, the centre of the ſyſtem, from a regard to this analogy. Being thus, as he imagined, poſſeſſed of the grand ſecret of the Pythagoreans, and pleaſed with the diſcovery, he publiſhed it in 1596, under the title of "Myſterium Coſmographicum." He ſent a copy of this book to Tycho Brahe, who did not approve of the ſpeculations contained in it, but wrote to Kepler, urging him firſt to lay a ſolid foundation in obſervations, and then, by aſcending from them, to ſtrive to come at the cauſes of things: and to this advice we are indebted for the more ſolid diſcoveries of Kepler. This great man, ſoon after the death of Tycho, found that aſtronomers had erred from the firſt riſe of the ſcience, in aſcribing always circular orbits and uniform motions to the planets; and he diſcovered that each of them moves in an ellipſis, which has one of its foci in the centre of the ſun; that the motion of each is really unequable, and varies in ſuch a manner, that "a ray ſuppoſed to be always drawn from the planet to the ſun deſcribes equal areas in equal times." It was ſome years later before he diſcovered the analogy that there is between the diſtances of the ſeveral planets from the ſun, and the periods in which they complete their revolutions. He has, however, left it upon record, that on the 15th of May, 1618, he found that "the ſquares of the periodic times are always in the ſame propertion as the cubes of the mean diſtances from the ſun." When Kepler ſaw, according to better obſervations, that his diſpoſition of the five regular ſolids among the planetary ſpheres was not agreeable to the intervals between their orbits, he endeavoured to diſcover other ſchemes of harmony. For this purpoſe, he compared the motions of the ſame planet at its greateſt and leaſt diſtances, and of the different planets in their different orbits, as they would appear viewed from the ſun; and here he fancied that he had found a ſimilitude to the diviſions of the octave in muſic.

Of theſe notions, which are wholly unfounded in nature, he was ſo fond, that hearing of the diſcovery of the four ſatellites of Jupiter by Galileo, he owns that his firſt reflections were from a concern how he could ſave his favourite ſcheme, which was threatened by this addition to the number of the planets. The ſame attachment led him into a wrong judgment concerning the ſphere of the fixed ſtars: for being obliged, by his doctrine, to allow a vaſt ſuperiority to the ſun in the univerſe, he reſtrains the fixed ſtars within very narrow limits; nor did he conſider them as ſuns placed in the centres of their ſeveral ſyſtems, having planets revolving round them. Kepler's great ſagacity, and continued meditations on the planetary motions, ſuggeſted to him ſome views of the true principles from which theſe motions flow. He ſpeaks of gravity as of a power that was mutual between bodies; and ſays, that the earth and moon tend towards each other, and would meet in a point, ſo many times nearer to the earth than to the moon, as the earth is greater than the moon, if their motions did not hinder it. He adds alſo, that the tides ariſe from the gravity of the waters towards the moon. But not having notions ſufficiently juſt of the laws of motion, he was unable to make the beſt uſe of theſe ideas; nor did he ſteadily adhere to them, for in his "Epitome of Aſtronomy," publiſhed many years after, he propoſes a phyſical account of the planetary motions derived from different principles. Kepler was author of ſeveral pieces beſides thoſe already mentioned, of which the following may be noticed: "Prodromus Diſſertationum Coſmographicarum;" "De Stella nova in Pede Serpentarii;" "Aſtronomia nova, ſeu Phyſica Cœleſtis, Tradita Commentariis de Motibus Stellæ Martis ex Obſervationibus Tychonis Brahei;" "De Cometis libri tres."

This great geometrician and aſtronomer, in his "Harmonices Mundi," publiſhed at Lintz, in Auſtria, in 1619, and dedicated to our James I., ſpeaks on the ſubject of muſic like a man who had not only thought of it as a ſcience ſubſervient to the laws of calculation, but in the language of one who had ſtudied it practically as an elegant art, and been truly ſenſible of its powers. And though the eloquent aſtronomical hiſtorian Bailly ſays, in a ſweeping deciſion, that "Kepler, from his veneration for Pythagoras and Plato, has plunged into muſical ratios, and blended them with the movements, diſtances, and eccentricities, of the planets, in his viſionary analogies; they contain not one ſingle true ratio or reſemblance: in a crowd of ideas there is not one ſingle truth." This ſevere cenſure of M. Bailly muſt be confined to the proportions and analogies between muſical intervals and the diſtances of the heavenly bodies: as the ratios of Kepler are accurate, as far as concerns muſic.

Neither Maclaurin nor Dr. Hutton have expreſſed themſelves ſo harſhly on his fancied ſimilitudes to the diviſions of the octave in muſic; which they indeed call the dreams of this ingenious man, as the harmony of the ſpheres had been of Pythagoras and Plato long before.

This great mathematician and precurſor of ſir Iſaac Newton was ſo far from allowing to the ancients, much as he reſpected them, ſuch harmony as is practiſed by the moderns, that he ſays, though Plato, in his "Republic," ſpeaks as if ſomething like it were in uſe, he ſuppoſes if they ever had any accompaniment to their melodies by way of baſe, it muſt have been ſuch a one as is produced by the drone of a bagpipe. This is perhaps being as unjuſt to the ancients, as thoſe are to the moderns, who will not allow them to have made any progreſs in muſic, becauſe they are unable, by their compoſitions and performance, to cure diſeaſes, tame wild beaſts, or build towns.

KEPLER's *Laws*, is a term uſed by aſtronomers to denote certain analogies between the diſtances of the planetary bodies from the ſun, and their times of periodic revolution; as alſo between the rate of motion in any revolving body, whether primary or ſecondary, and its diſtance from the central body about which it revolves. The latter of theſe, which is generally called Kepler's firſt law, being that which he firſt diſcovered, is commonly expreſſed as follows, *viz.*

1. Equal areas are deſcribed in equal times; that is, if a line be ſuppoſed to join the central and revolving body, this line always paſſes over, or deſcribes equal areas in equal times, whether the planet be in its aphelion, perihelion, or in any other part of its orbit.

2. The ſquares of the times of revolution of the planetary bodies are as the cubes of their reſpective diſtances from the ſun.

Theſe laws were firſt diſcovered by Kepler, the celebrated aſtronomer, whoſe name they bear;—a name which will be perpetuated as long as the ſcience of aſtronomy itſelf is known, and the ſublimity of its laws have charms to captivate the minds of philoſophers. The diſcovery of theſe analogies forms a moſt important epoch in the hiſtory of aſtronomy, as they may be conſidered as having paved the way to that ſublime and univerſal ſyſtem of attraction, the diſcovery of which has immortalized the name of Newton: for Kepler having deduced them from the compariſon of actual obſervations, and therefore independent of any theory, they formed a very uſeful criterion for the corroboration of any particular hypotheſis, as well as an important datum in the inveſtigation of new theories.

In order to form a proper eſtimate of the value of theſe improvements, and the difficulty their author had to encounter in eſtabliſhing them, we muſt look to the ſtate of aſtronomy at that period. Copernicus had juſt revived the Pythagorean ſyſtem, and Kepler was one of its ableſt advocates: but ſtill it was held as a ſacred principle, that the motions of all the planetary bodies were performed in uniform circular orbits; to reconcile which to actual appearances, many ingenious contrivances were made uſe of, and which, it muſt be allowed, repreſented the planetary motion with conſiderable exactneſs.

The angular motion of each of the planets conſiſts of two parts: one part increaſing uniformly with the time; and another which is periodical, and acquires all degrees of magnitude within a certain limit, in the ſeveral parts of the orbit. Now every ſuch motion was accounted for with a tolerable degree of accuracy, by the ancient contrivances of epicycles and deferents. Accordingly the ancient ſyſtems repreſented, with conſiderable exactneſs, thoſe obſerved places of the planets that depended only on the real angular motions; as at the oppoſitions. But they failed when applied to the other poſitions of the planets, and to the latitudes, where the apparent places depend not only on the angular motions, but likewiſe on the relative diſtances. It was here that all the ancient ſyſtems were alike defective; and it was by a ſtrict compariſon of obſervation with theory, that Kepler at laſt found himſelf obliged to depart from that principle of uniform circular motion, which had been ſo ſcrupulouſly adhered to by all his predeceſſors.

The ſituation of the heavenly bodies, in reſpect to one another, depends upon their real angular motions, and their relative diſtances. But when a planet is in oppoſition, the apparent places, as ſeen from the earth and ſun, are coincident, and its poſition is effected only by the angular motions; and, therefore, obſervations in oppoſition, being the ſimpleſt and the leaſt liable to inaccuracy, are of great uſe in aſtronomy. But in obſerving oppoſitions, a practice had been introduced, that in part defeated the purpoſe for which ſuch obſervations had been preferred to all others. A planet was reckoned to be in oppoſition, when its place in the heavens was removed 180° in longitude, not from the real place of the ſun, but from his mean place. It is evident, therefore, that by this practice the obſerver was not ſituated in the ſame line with the ſun and the planet, at the computed time of oppoſition; and, therefore, the apparent place of the planet was not entirely diveſted of the ſecond inequality, excepting in the rare caſe when the true place of the ſun coincided with his mean place. To this practice Kepler objected, and conceived the deſign of determining the orbit of Mars from real, inſtead of apparent oppoſitions; and he entertained the moſt ſanguine expectations of completely reforming the theory of the planets, by his projected innovation. Kepler's intended ſubſtitution of real for mean oppoſitions led him to examine the practice of aſtronomers in another important point. It very ſeldom happens that a planet is found in the plane of the ecliptic, in which the motion of the ſun is performed; and in order to aſcertain the place of the planet in its orbit at the time of obſervation, a reduction from the ecliptic to the plane of the orbit becomes neceſſary: and in examining the ancient methods of reduction, Kepler found them to be erroneous and inconſiſtent; and his inveſtigation ultimately eſtabliſhed this important concluſion, "that the orbits of the planets are invariable planes, interſecting each other in lines paſſing through the ſun's centre." This was a moſt important improvement, and of greater conſequence in ſimplifying the ſcience of aſtronomy than any that had been introduced in all the preceding ages; and his ſucceſsful and deciſive eſtabliſhment of its truth may be juſtly ranked among his greateſt diſcoveries.

Kepler having overcome all the difficulties that oppoſed his projected innovation, at length completed a theory of Mars, derived ſolely from apparent oppoſitions; and its accuracy was unqueſtionable in repreſenting the oppoſitions; but it totally failed when applied to the latitudes, and to the longitudes out of oppoſition. Diſappointed in the high expectation he had formed of his new theory, he yet drew from its failure an important inference, the firſt ſtep to emancipation from the ancient prejudice of uniform circular motion. For as the theory involved only two ſuppoſitions, *viz.* that the orbit of Mars was a circle, and that the motion of the planet was uniform about a fixed point in the line of apſides, he juſtly concluded that one at leaſt of theſe two ſuppoſitions was falſe. He now prepared for further reſearches; but, firſt of all, judged it neceſſary to examine the circumſtance that affected the theory of the earth's annual motion: for as the latitudes of the planets, and the longitudes out of oppoſition, (the phenomena which had hitherto rendered his attempts abortive,) depended on the diſtances of the earth from the ſun, it was requiſite to be aſſured that no errors crept in from this quarter.

Nor was Kepler without ſuſpicions of inaccuracy in the terreſtrial orbit. He had early remarked it as an anomaly, that an equant was aſſigned to all the planets, the Earth or Sun excepted; and although the authority of all aſtonomers was againſt him, he even then preſumed to doubt of the juſtneſs of the exception. Reſuming the examination of this point on the preſent occaſion, he eſtabliſhed, by multiplied and undeniable proof, that the eccentricity was biſected in the orbit of the Earth or Sun, as well as in the orbits of the other planets. Kepler, in turning his attention to the ſolar theory, had alſo a farther improvement in view, *viz.* a method for deriving the equations of the planetary orbits from a leſs arbitrary and precarious principle than that of the equant, or a centre of uniform angular motion. He had remarked, that it is a general fact in the ſolar ſyſtem, that the velocity of a planet diminiſhes as it recedes from the Sun, and increaſes as it approaches that luminary; and he concluded, that theſe two quantities, the velocity of a planet, and its diſtance from the Sun, muſt be related according to ſome law, which, if diſcovered, would enable aſtronomers to calculate the rate of a planet's motion for all points of its orbit, and, of courſe, to determine the equation, or correction due to the mean motion in every ſuch point. This was undoubtedly the concluſion of a man of genius and originality; for though we are now familiar with the notion, that whenever the variations of one quantity depend on thoſe of another, the one of the quantities may be expreſſed by ſome functions of the other; yet, in the days of Kepler, it muſt have required no ſmall effort of generalization to perceive this truth, and the important conſequences which reſult from it. Great difficulties, however, ſtood in the way of the inveſtigation; and Kepler had to ſtruggle, not only with his own precipitancy, which frequently led him into error, but with the imperfections of the geometry of that age, which were great in all matters connected with the quadrature of curves.

His ingenuity and perſeverance, however, at laſt prevailed. He found that the times of deſcribing ſmall arcs of the Earth's orbit, are as the diſtances from the Sun; that therefore the times of deſcribing any arcs whatever, muſt be as the ſums of thoſe diſtances; and having ſatisfied himſelf, from geometrical conſiderations, that the ſum of the diſtances may be expounded (at leaſt nearly) by the area contained between the arc and the radii drawn from its extremity to the centre, he inferred that the times of deſcribing any arcs whatever, are proportional to theſe areas, or which is the ſame, *That equal areas are deſcribed in equal times.* In conſequence of this improvement, Kepler began to ſpeculate on the nature of the force which produced ſo curious an adjuſtment; but the honour of this diſcovery was reſerved for the genius of the immortal Newton. When he again reſumed the conſideration of the orbit of Mars, he ſoon ſaw reaſon to conclude that this body deſcribed its orbit under the guidance of the ſame law that he had juſt found to hold on the Earth; *viz.* that the areas deſcribed by a line drawn from the planet to the Sun, are every where proportional to the time of deſcription.

The attempt, however, of computing the equation of Mars's motion on this principle, was attended with much difficulty, on account of the great eccentricity of the orbit, but ſtill more from that prejudice in favour of the old doctrine of circular orbits, which has been already mentioned. In his new method of computing the equations, Kepler ſuppoſed the orbit to be accurate; but the reſults, from the combination of the two principles, were ſuch as could not be reconciled with the places of Mars, obſerved by Tycho Brahe. In this dilemma, finding that he muſt give up one of the principles which he had adopted in his calculation, he firſt propoſed to ſacrifice his own theory to the authority of the old ſyſtem; thus giving one of the moſt memorable examples which has ever occurred, of the influence of candour and prejudice at the ſame moment. He ſoon found, however, that this ſacrifice would not anſwer his purpoſe, and that, in order to make the calculus agree with obſervations, it was the old hypotheſis, and not the new one, that muſt be abandoned.

Thus the idol was overthrown by which Kepler had been ſo long deceived, and the emancipation of aſtronomy was achieved; but many difficulties were yet to be overcome, before the empire of truth could be firmly eſtabliſhed.

It was proved, that the orbit of Mars was not circular, but its real form was yet undiſcovered. The hypotheſis which firſt preſented itſelf was, that this orbit is an oval or ellipſis, coinciding with the ſuppoſed circular orbit at the two apſides, but falling very much within it in the middle between them; and Kepler having aſſigned the proportions of the longer and ſhorter axes of the curve, according to views that he thought ſound; but which proved to be extremely fallacious, proceeded to deſcribe the ellipſis, to obtain its quadrature, to cut its area in any given proportion, and to derive from thence the equations of the mean motion; all which was accompanied with ſuch labour as nothing but his fortitude and perſeverance would have been able to overcome. He compared the diſtances of Mars, thus computed for no leſs than forty different arcs of anomaly, with the ſame as deduced from obſervation, and had the mortification to find, that they did by no means agree, but that the real places of the planet fell as far without the new oval, as within the old circular orbit. After trying many different means of correcting theſe errors with incredible labour, and always ſubjecting each hypotheſis to the ſevereſt teſt, he found, at length, that an ellipſe, with the ſun in one of its foci, and its greater axis equal to the mean diſtance of Mars, repreſented the whole motion of the planet with wonderful exactneſs. *The planets, therefore, deſcribe ellipſes, having the ſun in their common focus;* and this is the ſecond great diſcovery which delighted the mind, and has immortalized the name of Kepler.

His third diſcovery was that of a law of no leſs importance than either, the deſcription of equal areas, or the elliptic orbits of the planets; but it was made more eaſily than them, and without the ſame elaborate deductions. His ſtrong propenſity to trace out laws and diſcover analogies in nature, ſet him eagerly at work to find out what relation ſubſiſts between the diſtances of the planets from the ſun, and the times of their revolutions round him. The data here lay in a much ſmaller compaſs, and were much leſs various than in the two former reſearches; and Kepler, after making ſome fanciful compariſons between the diſtances of the planets, and the regular ſolids in geometry, and alſo between the ſame and the diviſions of the monochord, thought at laſt of comparing the different powers of theſe quantities with one another, from which compariſon, though not without ſome abortive attempts, this truth at laſt emerged, *that the ſquares of the periodic times of the planets, are as the cubes of their mean diſtances from the ſun.* He expreſſed, in ſtrong terms, the delight and aſtoniſhment he felt on the diſcovery of this ſimple and beautiful analogy. He has carefully marked the day on which the diſcovery was made, (8th May, 1618,) "and few," ſays a writer on this ſubject, "are the days in the hiſtory of the world that deſerve ſo well to be remembered."

After the happy idea of comparing the powers of the diſtances and times, the ſtep to the final reſult was extremely ſimple and eaſy; though it does not appear that Kepler employed any particular method for this purpoſe, but had recourſe to various trials before the real law was diſcovered.

Suppoſe, for inſtance, D, d, and δ, to repreſent the diſtances of any three planets, and T, t, τ, the three correſponding times of periodic revolution; then, in order to aſcertain whether any law ſubſiſts between theſe two ſeries of quantities, let us aſſume the following proportions: *viz.*

$$D^m : d^m :: T^n : t^n$$
$$D^m : \delta^m :: T^n : \tau^n$$

where m and n may repreſent any numbers whatever, either integral or fractional. Then

$$m \log. D + n \log. t = m \log. d + n \log. T$$
$$m \log. D + n \log. \tau = m \log. \delta + n \log. T$$

$$m (\log. D - \log. d) = n (\log. T - \log. t)$$
$$m (\log. D - \log. \delta) = n (\log. T - \log. \tau)$$

or
$$m \log. \frac{D}{d} = n \log. \frac{T}{t}$$
$$m \log. \frac{D}{\delta} = n \log. \frac{T}{\tau}$$

Whence again,

$$\log. \frac{D}{d} \times \log. \frac{T}{\tau} = \log. \frac{D}{\delta} \times \log. \frac{T}{t}.$$

which equality muſt neceſſarily obtain if any law ſubſiſt, and it is remarkable that it ſhould be totally independent of the law itſelf. Therefore, it was only neceſſary to ſubmit the above equality to examination, in order to be aſſured of the exiſtence or non-exiſtence of any analogy; and having thus aſcertained that ſome law muſt have place, the law itſelf is readily diſcovered from any of the above equations. Thus the equation $m \log. \frac{D}{d} = n \log. \frac{T}{t}$ gives immediately $\frac{n}{m} = \frac{\log. \frac{D}{d}}{\log. \frac{T}{t}}$, which fraction being reduced to the loweſt terms will furniſh the particular values of m and n. As theſe formulæ are applicable to any two ſeries of quantities, between which any law of this kind is ſuſpected to obtain, they are not altogether unworthy of attention. We have thus given a ſlight ſketch of the diſcoveries of this celebrated aſtronomer, which, had the limits of our article admitted of it, might have been extended to a much greater length; in the preſent inſtance, however, we can only refer the reader who wiſhes for more complete information on this intereſting ſubject, to Dr. Small's "Account of the Aſtronomical Diſcoveries of Kepler."

KEPLER'S *Problem.* See PROBLEM.

KEPPEL, AUGUSTUS, in *Biography*, a celebrated Engliſh admiral, the ſecond ſon of William, earl of Albemarle, was born April 2d, 1725. He entered the ſea-ſervice while he was young, accompanied commodore Anſon round the world, and by the zeal which he manifeſted in his profeſſion, was raiſed to the firſt honours which it had to beſtow. The moſt important occurrence in his life took place in 1778, when he had the command of the channel fleet, to which he had been appointed at the perſonal and urgent ſolicitation of the king, and which he readily accepted, though he could not help obſerving, that "his forty years ſervices were not marked by any favour from the crown, except that of its confidence in the time of danger." On the 12th of July he fell in with the French fleet, under count d'Orvilliers, off Uſhant: an engagement enſued, which, though partial, was very warm while it laſted. It was neceſſary to take a ſhort time to repair the damages: which being done, the admiral made proper ſignals for the van and rear diviſion to take their reſpective ſtations. This order was obeyed with great alacrity by ſir Robert Harland of the van, but admiral ſir Hugh Palliſer of the rear took no notice of the ſignal, and refuſed to join his commander, till night prevented a renewal of the battle. The French, taking advantage of the darkneſs, eſcaped to their own coaſt. Admiral Keppel, willing to excuſe ſir Hugh Palliſer, at leaſt to ſcreen him from public reſentment, wrote home ſuch a letter as ſeemed even to imply great impropriety of behaviour in the commander himſelf. The conduct, however, of the rear-admiral was attacked in the public papers: he demanded of his commander a formal diſavowal of the charges brought againſt him, which Keppel indignantly refuſed. He immediately exhibited articles of accuſation againſt the commander-in-chief, for miſconduct and neglect of duty, although he had a ſecond time failed with him, and had never uttered a ſyllable to his prejudice. The lords of the admiralty, to the aſtoniſhment of the nation, inſtantly fixed a day for the trial of admiral Keppel: he was moſt honourably acquitted, and received the thanks of both houſes of parliament for his ſervices. Palliſer was next tried, and eſcaped with a cenſure only, but the reſentment of the public was ſo great, that he was obliged to reſign ſeveral offices which he held under government, and to vacate his ſeat in parliament. The acquittal of Keppel was celebrated with the moſt magnificent illuminations, and other marks of rejoicing which had never been known at that time in this country, and the houſes of lord Sandwich, firſt lord of the admiralty, and ſir Hugh Palliſer, were with difficulty ſaved from deſtruction; the windows and much of the furniture being demoliſhed by the fury of the populace. In 1782, admiral Keppel was raiſed to a peerage, with the titles of viſcount Keppel, baron Elden: he was afterwards, at two different periods, appointed firſt lord of the admiralty. He died Oct. 3d, 1786, unmarried, and of courſe his titles became extinct. He was a thorough ſeaman, and a man of great integrity and humanity. Gent. Mag.

Keppel's *Bay*, in *Geography*, a bay of the South Pacific ocean, on the N.E. coaſt of New Holland. S. lat. 23° 28'. E. long. 150° 33'.

Keppel's *Iſland*, or *Traitor's Iſland*, an iſland in the South Pacific ocean. S. lat. 15° 53'. W. long. 172° 33' to 175° 13'.—Alſo, a ſmall iſland on the N. ſide of the moſt weſterly of the Falkland iſlands, in the S. Atlantic ocean. S. lat. 51° 24'. W. long. 60° 15'.—Alſo, one of thoſe called queen Charlotte's iſlands, in the S. Pacific ocean. S. lat. 10° 15'. W. long. 134° 56'.

Keppel's *Iſlands*, a group of iſlands near Keppel's bay, on the N.E. coaſt of New Holland, diſcovered by captain Cook in the year 1770. Near theſe iſlands the water, which was too ſhallow for fiſh, abounded with crabs, which were of two ſorts, and both ſuch as had not been ſeen before: one of them was adorned with the fineſt blue that can be imagined, in every reſpect equal to the ultramarine, with which all his claws and every joint were deeply tinged; the under part of it was white, and ſo exquiſitely poliſhed, that in colour and brightneſs it reſembles the white of old China; the other was alſo marked with the ultramarine upon his joints and toes, but ſomewhat more ſparingly, and his back was marked with three brown ſpots, which had a ſingular appearance. S. lat. 25° 8'. W. long. 209° 1'. Hawkeſworth's Voyages of Cook, &c. vol. iii.

KEPSE, a town of Syria, on the coaſt of the Mediterranean, and on the N. ſide of the mouth of the Orontes, about a mile from the ſea; ſituated, as it is ſuppoſed, on the ſcite of the ancient *Seleucia*, which ſee.

KEPTA, a town of Bootan; 24 miles S. of Taſſaſudon.

KERAMIANS, a heretical ſect of Mahometans, the followers of Mohammed Ebn Kerâm, called alſo Mojaſſemians, or Corporealiſts, who not only admitted a reſemblance between God and created beings, but declared God to be corporeal. They were led to this notion by the literal acceptation of thoſe paſſages in the Koran, which figuratively attribute corporeal actions to God, and of the words of Mahomet, when he ſaid, that God created man *in his own image*, and that himſelf had *felt the fingers of God*, which he laid on his back, to be *cold*.

KERAMO, in *Geography*, a town of Aſiatic Turkey, in Natolia; 24 miles S.S.E. of Milets.

KERANA, a long ſort of trumpet: ſomewhat in form of a ſpeaking-trumpet, uſed by the Perſians.

To the ſound of this, they add a confuſed noiſe of hautboys, timbrels, drums, and other inſtruments, every evening at ſun-ſet, and two hours after midnight.

KERATI, in *Geography*, a town of Aſiatic Turkey, in Caramania; 26 miles N.W. of Beiſhebri.

KERATIA, a town of European Turkey, in Livadia; 24 miles S.S.E. of Athens.

KERATOPHYTUM, in *Natural Hiſtory*, a ſpecies of *Gorgonia*; which ſee.

KERAUN, in *Geography*, a town of Hindooſtan, in Lahore; 15 miles W.N.W. of Gujurat.

KERBEH, a town of Natolia; 44 miles N.E. of Iſmid.

KERBOOZA. a town of Hindooſtan, in Lahore; 32 miles S.E. of Attock.

KERCAL, a town of Africa, in Fez, on the coaſt of the Mediterranean; 45 miles E.S.E. of Tetuan.

KERCH, or Kertsch, a fortified town of Ruſſia, in the province of Tauris, on the channel between the Black ſea and the ſea of Azoph. It was founded by a colony of Greeks from Miletus, and afterwards ſubdued by the kings of Boſphorus. In the year of Rome 689, it was taken by Mithridates, king of Pontus, who, in conſequence of the rebellion of his ſon Pharnaces, was beſieged in the caſtle, and at his own requeſt put to death by an officer of the Gauls, who had forced the walls; 100 miles E.S.E. of Perekop. N. lat. 45° 16'. E. long. 36° 14'.

KERCHA, a town of Perſia, in Chuſiſtan; 30 miles N.W. of Suſter.

KERCKRING, Theodore, in *Biography*, a celebrated phyſician, was a native of Amſterdam. He had attained the age of eighteen, when he began the ſtudy of the Latin language, under the tuition of Francis Van Ende, and ſoon afterwards applied himſelf to medicine with ſo much zeal and ſucceſs, that he obtained a high reputation, both in the practice of the profeſſion, and by his anatomical and chemical diſcoveries. He continued the exerciſe of his art at Amſterdam for ſeveral years, and married the daughter of his preceptor, before mentioned; after which he ſettled at Hamburgh in the year 1678, where, after having for a long time held the appointment of reſident from the grand duke of Tuſcany, he died in November, 1693. Anatomy was the favourite ſubject of his reſearches, and he formed an anatomical muſeum, which was long an object of admiration, and the reſort of the curious, who viſited that city. His principal writings were likewiſe upon anatomical ſubjects; they are as follows: 1. "Spicilegium Anatomicum, continens Obſervationum Anatomicarum rariorum Centuriam unam, necnon Oſteogeniam Fœtuum, in quâ, quid cuique oſſiculo ſingulis accedat menſibus, quidque decedat & in eo per varia immutetur tempora, accuratiſſimè oculis ſubjicitur." Amſt. 1670, 1673. 2. "Anthropogeniæ ichnographia, ſive, conformatio Fœtus ab ovo uſque ad oſſificationis principia, in Supplementum Oſteogeniæ Fœtuum." (Ibid. 1671.) In this work the developement of the fœtus, at different periods of its age, is traced with great attention and minuteneſs. 3. "Commentarius in Currum Triumphalem Antimonii Baſ. Valentini." (Ibid. 1671.) This is chiefly a tranſlation of Baſil Valentine's work, from the

German to the Latin. A poſthumous collection of his anatomical writings was publiſhed at Leyden in 1717, with the title of "Opera omnia Anatomica." Eloy. Dict.

KERCOLANG, in *Geography*, an iſland in the Eaſt Indian ſea, about 80 miles in circumference, inhabited by Malays. N. lat. of the north extremity 4° 28′. E. long. 126 30′.

KERDA, a town of Sweden, in the province of Smaland; 38 miles W.N.W. of Wexio.

KERDECAN, a town of Perſia, in the province of Kerman; 22 miles N.W. of Sirgian.

KERDISTAN, a town of Perſia, in Chuſiſtan; 90 miles E.S.E. of Suſter.

KERDIZ, a town of Candahar, in Cabuliſtan; 70 miles E. of Ghizni.

KEREDGE, a town of Perſia, in Irak; 15 miles S.W. of Sava.

KERELO, a town of Tranſylvania, on the Maros; 20 miles W.N.W. of Scheſburg.

KEREMPIBURUN, called *Cape Crampe*, a cape on the N. coaſt of Natolia, on a neck of land which projects into the Black ſea. N. lat. 42° 45′. E. long. 33° 10′.

KEREN, a town of Perſia, in Irak; 45 miles W. of Kermanſha.

KERESBANJA, a town of Tranſylvania; 44 miles S.S.W. of Coloſvar. N. lat. 46° 16′. E long. 22 25′.

KERESOUN, a town of Turkiſh Armenia, at the mouth of a river of the ſame name, which runs into the Black ſea, anciently a city of Pontus, called *Ceraſus*; which ſee.

KERESZTUR, a town of Tranſylvania; 36 miles N. of Scheſburg.

KERET, a town of Ruſſia, in the government of Archangel, on the White ſea; 148 miles S. of Kola.

KERETSKOI, a town of Ruſſia, in the government of Archangel, on the White ſea; 32 miles N. of Archangel.

KERF is the notch or ſlit that is made by the ſaw between two pieces of wood, when they are ſawing aſunder.

KERFE-KARUMFEL, in the *Materia Medica*, a name given by Avicenna, and others, to the wood of the clove-tree, as the wood of the cinnamon-trre was called *kerſe darſini*; and many others in the ſame manner.

KERGONG, in *Geography*, a town of Hindooſtan, in Candeiſh; 45 miles S. of Indore.

KERGUELEN's LAND, otherwiſe called the *Iſland of Deſolation*, an iſland in the Southern Indian ocean, firſt diſcovered in 1772, and afterwards viſited, in 1773, by M. de Kerguelen, who, in his ſecond voyage, diſcovered ſome other ſmall iſlands in its vicinity. Kerguelen has, ſince the death of captain Cook, publiſhed the journal of his proceedings in theſe two ſucceſſive voyages, and has annexed to his narrative a chart of the coaſts of this land, as far as he had explored them in both voyages. M. de Pagés, much about the ſame time, favoured the public with another account of the ſecond voyage, in ſome reſpects fuller than Kerguelen's own, on board of whoſe ſhip he was then an officer. Captain Cook fell in with theſe iſlands in December 1776; and of the firſt he ſays, that it is an iſland of conſiderable height, and about three leagues in circuit. To this iſland Kerguelen had given the name of "Croy," or "Crouy;" and the view of it in his chart exactly correſponds with Cook's account of its being of conſiderable height. Cook obſerved another iſland of the ſame magnitude, one league to the eaſtward, which Kerguelen had called "Iſle Rolland," after the name of his own ſhip, and of which he has given a view in his chart. Between theſe two iſlands Cook obſerved ſome ſmaller ones in the direction of S.E. In the direction S. by E. ¼ E. from the E. end of the firſt iſland, a third high iſland was ſeen. This appears to have been Kerguelen's "Iſle de Clugny," as marked on his chart. Another iſland in the N.E. direction was a high round rock, named by captain Cook 'Bligh's Cap," which he juſtly concluded to be the ſame which M. de Kerguelen called the "Iſle of Rendezvous," though Cook ſays "I know nothing that can rendezvous at it but fowls of the air; for it is certainly inacceſſible to every other animal." Bligh's Cap was aſcertained to be in S. lat. 48° 29′. E. long. 68° 40′. The French and Engliſh navigators agree very nearly with reſpect to the latitude of this iſland; but they differ as to its longitude. The pilot at Teneriffe made it only 64° 57′ E. from Paris, which is about 67° 16′ E. from London; or 1° 24′ more weſterly than captain Cook's obſervations fix it. M. de Pagés ſays it is 66° 47′ E. from Paris, that is, 69° 6′ E. from London, or 26 miles more eaſterly than it is placed by captain Cook. Kerguelen himſelf only ſays, that it is *about* 68° E. long. The northern point of this land captain Cook erroneouſly concluded to be the "Cape Louis" of the firſt diſcoverers; whereas, by an inſpection of Kerguelen's chart, this northern point deſcribed by Cook, is the ſame with that to which the French have given the name of "Cape François." The whole extent of coaſt lying between Cape Louis and Cape François, of which the French ſaw very little during their firſt viſit in 1772, and which may be called the N.W. ſide of this land, they had it in their power to trace the poſition of in 1773; and they have aſſigned names to ſome of its bays, rivers, and promontories upon their chart. On the 25th of December (Chriſtmas day), captain Cook anchored in the harbour from this circumſtance denominated "Chriſtmas Harbour," which ſee. On the 27th many of the ſhip's crew went on ſhore, and made excurſions, in different directions, into the country, which they found barren and deſolate in the higheſt degree. They brought with them a quart bottle, which was found faſtened with wire to a projecting rock on the N. ſide of the harbour. This bottle contained a piece of parchment, with the following inſcription: "Ludovico XV. Galliarum rege, et D. de Boynes regi a ſecretis ad res maritimas annis 1772 et 1773." Captain Cook, as a memorial of having been in this harbour, cauſed to be written on the other ſide of the parchment this inſcription: "Naves Reſolution et Diſcovery de Rege Magnæ Britanniæ, Decembris 1776." This parchment was put again into a bottle with a ſilver two-penny piece of 1772; and the bottle, having been covered with a leaden cap, was placed on a pile of ſtones erected for the purpoſe, upon a little eminence on the N. ſhore of the harbour, near the place where it was firſt found. The Chriſtmas harbour of captain Cook is the ſame with the "Baie de l'Oiſeau" of the French, and Cape François, and not Cape St. Louis, is the northern point of this land; and the account of the S. point of the harbour given by M. de Pagés and captain Cook remarkably agree. The land on both ſides of the inlet is high, and it runs in W., and W.N.W. about two miles. Its breadth is 1¼ mile, for more than half its length; above which it is only half a mile. The depth of water is 45 fathoms at the entrance, and varies, in proceeding farther inward, from thirty to five and four fathoms. The ſhores are ſteep, and the bottom is every where a fine dark ſand, except near the ſhore, where are beds of ſea-weed. The head of the harbour lies open only to two points of the compaſs; and even theſe are covered by iſlands in the offing, ſo that no ſea can fall in to hurt a ſhip. It is high water here at the full and change days, about 10 o'clock; and the tide riſes and falls about four feet. Captain Cook explored this iſland, and other iſlands adjacent to it, with a view of extending Kerguelen's diſcovery. After having anchored in another harbour, called "Port Palliſer," and ſituated in S. lat. 49° 3′. E. long. 69° 37′, and finding no encouragement to continue his reſearches, captain Cook put to ſea. The French diſcoverers, with ſome reaſon, imagined Cape François to be the projecting point of a ſouthern continent. "The Engliſh have ſince proved that no ſuch continent exiſts; and that the land in queſtion is an iſland of no great extent, which, from its ſterility," ſays captain Cook, "I ſhould, with great propriety, call the "Iſland of Deſolation," but that I would not rob M. de Kerguelen of the honour of its bearing his name." Kerguelen now concurs with captain Cook as to its being an iſland: but he apprehends, that it is about 200 leagues in circuit; and he ſays, that he was acquainted with about 80 leagues of its coaſt. After all, it cannot but be remarked, that Kerguelen was peculiarly unfortunate, in having done ſo little to complete what he had begun. He diſcovered, indeed, a new land, but, in two expeditions to it, he could not once bring his ſhips to an anchor upon any part of its coaſts. Captain Cook had either fewer difficulties with which to ſtruggle, or was more ſucceſsful in ſurmounting them. From the account of Mr. Anderſon, ſurgeon to captain Cook, who loſt no opportunity of ſearching the country in every direction, we make the following extract.

"Perhaps no place, hitherto diſcovered in either hemiſphere, under the ſame parallel of latitude, affords ſo ſcanty a field for the naturaliſt as this barren ſpot. The verdure, which appears when at a little diſtance from the ſhore, would flatter one with the expectation of meeting with ſome herbage; but in this we were much deceived. For on landing, we ſaw that this lively colour was occaſioned only by one ſmall plant, not much unlike ſome ſorts of ſaxifrage, which grows in large ſpreading tufts to a conſiderable way up the hills. It forms a ſurface of a pretty large texture, and grows on a kind of rotten turf, into which one ſinks a foot or two at every ſtep. This turf, dried, might, in caſes of neceſſity, ſerve for fuel, and is the only thing we met with here that could poſſibly be applied to this uſe. There is another plant, plentifully enough ſcattered about the boggy declivities, which grows to near the height of two feet, and not much unlike a ſmall cabbage, when it has ſhot into ſeeds. The leaves about the root are numerous, large, and rounded; narrower at the baſe, and ending in a ſmall point. Thoſe on the ſtalks are much ſmaller, oblong, and pointed. The ſtalks, which are often three or four, all riſe ſeparately from the root, and run into long cylindrical heads, compoſed of ſmall flowers. It has not only the appearance, but the watery acrid taſte of the antiſcorbutic plants, and yet differs materially from the whole tribe; ſo that we looked upon it as a production entirely peculiar to the place. We ate it frequently raw, and found it almoſt like the New Zealand ſcurvy-graſs. But it ſeemed to acquire a rank flavour by being boiled." In our gardens it might, by cultivation, ſo far improve as to be an excellent pot-herb. Two other ſmall plants were found near the brooks and boggy places, which were eaten as ſallad; the one almoſt like garden creſſes, and very fiery; and the other very mild. This laſt, though but ſmall, is in itſelf a curioſity; having not only male and female, but what the botaniſts call androgynous plants. A coarſe graſs, which we cut down for the cattle, grows pretty plentifully in a few ſmall ſpots about the ſides of the harbour, with a ſmaller ſort, which is rarer: and upon the flat ground, a ſort of gooſe-graſs, and another ſmall plant much like it. In ſhort, the whole catalogue of plants does not exceed ſixteen or eighteen, including ſome ſorts of moſs, and a beautiful ſpecies of lichen, which grows upon the rocks higher up than the reſt of the vegetable productions. Nor is there even the leaſt appearance of a ſhrub in the whole country. "Nature has been rather more bountiful in furniſhing it with animals; though, ſtrictly ſpeaking, they are not inhabitants of the place, being all of the marine kind; and, in general, only uſing the land for breeding, and for a reſting-place. The moſt conſiderable are ſeals, or (as we uſed to call them) ſea-bears; being that ſort called the urſine ſeal. Theſe come aſhore to reſt or breed; but they were not very numerous; which is not to be wondered at, as it is known, that theſe animals rather frequent out-rocks, and little iſlands lying off coaſts, than bays or inlets. They were, at this time, ſhedding their hair, and ſo tame, that we killed what number we choſe. No other quadruped, either of the ſea or of the land kind, was ſeen; but a great number of birds, *viz.* ducks, petrels, albatroſſes, ſhags, gulls, and ſea-ſwallows." Penguins form by far the greateſt number of birds here, and are of three ſorts. The ſhags of this place are of two ſorts; the leſſer cormorant or water-crow, and another which is black above with a white belly; the ſame that is found in New Zealand, Terra del Fuego, and the iſland of Georgia. Another ſort of white bird, flocks of which flew about the bay, is very ſingular; having the baſe of the bill covered with horny cruſt. It is larger than a pigeon, with the bill black and the feet white, made like thoſe of a curlew. Some of the people put it in competition with the duck, as food. The ſeine was hauled once, but we found only a few fiſh about the ſize of a ſmall haddock." "The only ſhell-fiſh are a few limpets and muſcles, and, among the ſtones, a few ſmall ſtar-fiſh and ſea-anemonies were found.

"The hills are of a moderate height; yet many of their tops were covered with ſnow at this time, though anſwering to our June. Some of them have large quantities of ſtone irregularly heaped together at their foot, or on their ſides. The ſides of others, which form ſteep cliffs towards the ſea, are rent from the top downward, and ſeem ready to fall off, having ſtones of a conſiderable ſize lying in the fiſſures. Some were of opinion, that froſt might be the cauſe of theſe fiſſures, which I ſhall not diſpute; but how others of the appearances could be effected, but by earthquakes, or ſome ſuch ſevere ſhocks, I cannot ſay."—"It appears that rain muſt be almoſt conſtant here, not only from the marks of large torrents having ruſhed down, but from the diſpoſition of the country, which, even on the hills, is almoſt an entire bog or ſwamp, the ground ſinking at every ſtep. The rocks, or foundations of the hills, are compoſed chiefly of a dark blue, and very hard ſtone, intermixed with ſmall particles of glimmer or quartz." "Another browniſh brittle ſtone forms here ſome conſiderable rocks; and one which is blacker, and found in detached pieces, incloſes bits of coarſe quartz. A red, a dull yellow, and a purpliſh ſandſtone are alſo found in ſmall pieces; and pretty large lumps of ſemi-tranſparent quartz, diſpoſed irregularly in polyedral pyramidal cryſtals of long ſhining fibres. Some ſmall pieces of the common ſort are met with in the brooks, made round by attrition; but none hard enough to reſiſt a file. Nor were any of the other ſtones acted on by aquafortis, or attracted by the magnet. Nothing, that had the leaſt appearance of an ore or metal, was ſeen." S. lat. 49° 20′. E. long. 69° 30′. Cook's Third Voyage, vol. i.

KERI-CHETIB, are various readings in the Hebrew bible: *keri* ſignifies that which is read; and *chetib* that which is written. (See CHETIB *and* KERI.) It is generally ſaid by the Jewiſh writers, that theſe corrections were introduced by Ezra; but it is moſt probable that they had their original from the miſtakes of the tranſcribers after the time of Ezra, and the obſervations and corrections of the Maſorites. Thoſe keri-chetibs, which are in the ſacred books written by Ezra himſelf, or which were taken into the canon after his time, could not have been noticed by Ezra himſelf; and this affords a preſumption, that the others are of late date. Theſe words amount to about a thouſand; and Dr. Kennicott, in his "Diſſertatio Generalis," remarks, that all of them, excepting fourteen, have been found in the text of manuſcripts.

KERJE, or El Kerdsje, in *Geography*, a diſtrict of the province of Neged, or Nedsjed, in Arabia, lying on the S.W. part of this province, and of courſe on the frontiers of Yemen, extending along the eaſt of Hedsjaz, or Hejaz, a conſiderable way to the N. In this diſtrict is the city of Imam, famous even before the days of Mahomet, for being the native city of Mozeilama, who ſet himſelf up as a prophet. This province alſo compriſes other towns, among which is Salernia, on the confines of Yemen.

KERIGAR, a town of Hindooſtan, in the ſoubah of Oude; 80 miles N. of Lucknow. N. lat. 28° 12′. E. long. 81° 25′.

KERIKERD, a town of Perſia, in Chuſiſtan, taken by Timur Bec in 1393; 15 miles N. of Suſter.

KERIMGUNGE, a town of Hindooſtan, in Bahar; 24 miles E.S.E. of Hajypour.

KERION, a town of Thibet, 24 miles N.W. of Serangpour. N. lat. 32° 35′. E. long. 83°.

KERISONGAR, a lake of America, in the diſtrict of Maine, which ſends its waters to Penobſcot river.

KERIST, a town of Perſia, in Farſiſtan; 106 miles S.S.E. of Schiras.

KERKA, a town of Perſia, in Chuſiſtan; 45 miles W. of Toſtar.

KERKELAN, a town of Aſiatic Turkey, in the government of Sivas; 30 miles W.S.W. of Amaſieh.

KERKENI, a ſmall iſland near the E. coaſt of Tunis. N. lat. 34° 59′. E. long. 11° 12′.

KERKER, a town of Aſiatic Turkey, in Aladulia, on the Euphrates; 30 miles S. of Malatia.

KERKHA, a town of Perſia, in Chuſiſtan, on the Karaſu; 15 miles N. of Suſter.

KERKHERDERE, John Gerard, in *Biography*, a learned profeſſor of the univerſity of Louvain, was born in the neighbourhood of Maeſtricht, about the year 1678. He purſued his academical ſtudies at Louvain, and diſtinguiſhed himſelf during ſeveral years for his accurate and comprehenſive knowledge of hiſtory and the belles-lettres. In 1708, he was appointed hiſtoriographer to the emperor Joſeph I., and died in the year 1738. He was author of many works in general hiſtory and theology, of which the principal are entitled "De Monarchia Romæ Paganæ ſecundum Concordiam inter S. S. Prophetas Danielem et Joannem, &c.:" and "Prodromus Danielicus ſive novi Conatus hiſtorici, critici, in celeberrimas difficultates Hiſtoriæ veteris Teſtamenti." Theſe pieces are diſtinguiſhed by profound erudition and great critical acumen, and are ſaid to throw much light on many obſcure paſſages in the ſcriptures relating to hiſtory, chronology, and geography. He publiſhed a Latin grammar, and a number of Latin poems.

KERKIL, or Ghergil, in *Geography*, a town of Curdiſtan; 35 miles S.S.E. of Amadieh.

KERKISIA, or Kerkisieh, a town of Aſiatic Turkey, in the province of Diarbekir, now decayed; eight miles N. of Rabba. N. lat. 35° 18′. E. long. 40° 10′.

KERKONI, a town of Georgia; 25 miles S.W. of Teflis.

KERKUK, a town of Curdiſtan, the capital of a government, and reſidence of a pacha; ſurrounded with walls and defended by a caſtle; 150 miles N. of Bagdad. N. lat. 35° 59′. E. long. 43° 42′.

KERKWYCK, a town of Holland, in the department of Guelderland; two miles S. Bommel.

KERL, John Gaspar, in *Biography*, a native of Saxony, but having acquired in early youth great reputation as an organ player, he was called to Vienna by the archduke Leopold, and appointed organiſt at his court; and manifeſting ſigns of extraordinary genius for compoſition, he was placed under Giovanni Valentini, maeſtro di cappella at the Imperial court, and afterwards ſent to Rome to ſtudy under Cariſſimi. Upon his return to Germany, great offers were made to him from the elector palatine, if he would enter into his ſervice; but he declined them, and preferred ſettling at Munich, where he became maeſtro di cappella to the elector of Bavaria, Ferdinando Maria. His principal work as a compoſer was his "Modulatio organica ſuper Magnificat Octo Tonis Eccleſiaſticis Reſpondens," engraved and publiſhed at Munich, in 1686. Kerl was eſteemed one of the moſt able and ſkilful organiſts of his time. In a competition with ſome Italian muſicians at the court of the elector of Bavaria, he is ſaid by Walther to have compoſed a piece for the organ of wonderful contrivance, which none but himſelf could execute.

KERLE, Jacob de, canon of the cathedral of Cambray, from Ypres, was a very voluminous compoſer, contemporary with Gaſpar. He publiſhed "Pecces ſpecialis ſucceſſu," in 1569; "Caſmen Italica muſicis modulis ornata," 1570; "Cantiones ſacras, 5 & 6 vocum," 1571; in 4to. Venice, 1573, two, four, and five-part motetti, four and five-part maſſes, and a Te Deum.

KERLEH, in *Geography*, a circar of Hindooſtan, in Berar, N.W. of Goondwana, and S.E. of Hindia and Bopaltol.

KERMAN, anciently *Caramania*, a province of Perſia, bounded on the N. by Segeſtan, on the E. by Mekran, on the S. by the Perſian gulf, and on the W. by Farſiſtan and Lariſtan. The northern part is barren and almoſt deſert, without rivers or brooks, and the air unhealthy; towards the S. the air is more pure, and the land fertile. This province contains a city of the ſame name (ſee Sirgian); but ſome authors repreſent Yezd as the capital. (See Yezd.) The Guebres in this province are numerous; and are chiefly employed in manufactures of ſtuffs and ſilk. Here are ſome mines of copper, lead, and iron. The great deſert of Kerman joins with the Great Saline deſert, by the Nauben Dejiam, and extends about 350 miles. The Saline deſert extends from the vicinity of Kom to that of the ſea of Zurra, in a line from E. to W. of about 400 Britiſh miles; the breadth from N. to S. being about 250. Theſe two extenſive deſerts may be conſidered as ſtretching N.W. and S.E. for a ſpace of about 700 miles, by a medial breadth of about 200 (without including in the length other 200 miles of the deſert of Mekran), thus interſecting the wide empire of Perſia into two nearly equal portions. This vaſt extent is impregnated with nitre and other ſalts, which taint the neighbouring lakes and rivers.

Kerman. See Sirgian.

KERMANA, a town of Hindooſtan, in Oude; 40 miles E. of Bahraiteh.

KEMANSHER, a town of Perſia, in the province of Kerman; 130 miles S.E. of Sirgian. N. lat. 28° 20′. E. long. 58° 50′.

KERMANTSCHUK, a town of Circaſſia, near which the Mogul Tartars were ſurpriſed by the Ruſſians in 1783, and defeated with great loſs.

KERMASIN, a town of Perſia, in the province of Kerman; 160 miles S.E. of Sirgian.

KERMES, a kind of little animal, found in great plenty in many parts of Aſia and the S. of Europe, on an evergreen of the oak kind, and forming excreſcences, or *niduſes*, of conſiderable uſe, both in phyſic and dyeing. That which was brought from Galatia and Armenia was formerly preferred; but at preſent it is chiefly gathered in Languedoc, Spain, and Portugal.

The kermes, called alſo *ſcarlet grain*, and by the Greeks *coccos baphica*, by the Latins *vermiculus*, by the French ſometimes *vermilion*, or *grain de gale*, or *vermeil*, is about the ſize of a juniper-berry, round, ſmooth, and gloſſy; of a beautiful red colour, and full of a mucilaginous juice, of the ſame dye; it is found adhering to the bark on the ſtem and branches of a peculiar ſort of ſcarlet oak. See Coccus *Ilicis*.

Kermes has been ſuppoſed to derive its name from an Arabic word, ſignifying a little worm, *vermiculus*, whence it has been called vermilion. Aſtruc deduces the name from two Celtic words, one of which ſignifies an oak, the other an acorn.

This inſect hangs to the tree from which it is gathered by means of a cottony down, which, according to M. Chaptal, has many characteriſtics of the caoutchouc, being inſoluble in alcohol, melting at the heat of boiling water, and burning with a flame on the coals. In Languedoc, about the middle of May, when this inſect has attained to its proper ſize, and when in colour and ſhape it reſembles a ſmall ſloe, the harveſt commences, and the peaſants begin to gather it. This harveſt continues till about the middle of June, or later, if the great heats be retarded, or no violent rains fall; for one heavy ſtorm of rain puts an end to the gathering for that year. The perſons employed in this buſineſs are women, who ſet out early in the morning, with a lanthorn and a glazed earthen pot, ſo as to pick off the kermes from the branches before day, which is the moſt favourable time for this buſineſs. A ſingle perſon may gather from one to two pounds a day. At the commencement of the harveſt, the kermes weighs more, but fetches a leſs price than at the end, when it is drier and lighter.

According as the winter has been more or leſs mild, the harveſt of kermes is the more or leſs plentiful; and the people always preſage themſelves a fine ſeaſon, when the ſpring has been free from froſts and fogs. It is obſerved, that the loweſt and oldeſt ſhrubs are always the fulleſt of this inſect; and the kermes produced on thoſe trees, which are in the neighbourhood of the ſea, is always larger and finer than from the inland places.

It is no uncommon thing to have two harveſts of kermes in a year. Thoſe of the latter ſeaſon are ſmaller and leſs valuable than thoſe of the firſt, and are found not on the branches, but on the leaves of the ſhrub; which is juſt analogous to the cuſtom of the gall-inſects of all other kinds; all which, about this age, leave the branches to feed on the leaves, where their yet tender trunks can find an eaſier entrance.

From this analogy between the kermes, and other inſects of the ſame claſs, it ſhould ſeem worth while to try, whether ſome of thoſe may not poſſeſs the ſame virtues in medicine, at leaſt, if not in the arts. It is certain that the common oak produces a red-gall inſect of the very ſhape of the kermes, and of the colour of the paler ones. Reaumur. See the article Coccus.

The kermes is of a vinous ſmell, a bitter, rough, and pungent taſte; and its pulp, or juice, is pregnant with numerous minute ova.

The animal retains theſe ova under her belly, till they hatch into a very numerous offspring.

Hence, when the kermes is dried, there comes out of it an infinite number of little inſects, and flies, ſo ſmall, that they are ſcarcely viſible; inſomuch, that the whole inward ſubſtance ſeems converted into them. This ſhell is nothing but the body of the mother, diſtended by the growth of the eggs. To prevent this inconvenience, they uſually ſteep the kermes in vinegar before it be dry; and thus prevent the excluſion of the ova, and kill ſuch animals as are already hatched. It is afterwards dried on linen cloths. This operation gives it a colour like that of red wine. They draw the juice, or pulp, from the kermes, by pounding it in a mortar, and then ſtraining it through a ſieve: of this they make a ſyrup, by adding a ſufficient quantity of ſugar. Sometimes they dry the pulp ſeparate from the huſk; which pulp, thus dried, they call *paſtel of kermes*. If the living inſect be bruiſed, it gives out a red colour.

The kermes was formerly of great uſe in phyſic: eſteemed to be cardiac, deſiccative, and aſtringent; to fortify the ſtomach, and prevent abortion. Of this was made that celebrated confection called *alkermes*.

The reſtringent and corroborant confection that was ſold in the ſhops, was prepared by diſſolving, in the heat of a water-bath, ſix ounces of fine ſugar, in ſix ounces, by meaſure, of damaſk roſe-water; then adding three ounces of the juice of kermes, warmed and ſtrained; and after the whole had grown cold, mixing half a ſcruple of oil of cinnamon. This confection was taken, from a ſcruple to a dram, or more, either by itſelf, or in juleps, with which it mingles uniformly, without injuring their tranſparency.

The dried grains of kermes, if they have not been too long kept, give out, both to water and to rectified ſpirit, the ſame deep red colour, and nearly the ſame kind of ſmell and taſte with thoſe of the expreſſed juice. The inſpiſſated extracts are conſiderably bitter, aſtringent, and of a kind of mild balſamic pungency.

It is, however, of greater uſe in dyeing ſcarlet; for which uſe, the manner of preparing it is as follows: the kermes being taken when ripe, they ſpread it on linen; and at firſt, while it abounds moſt in moiſture, turn it twice or thrice a day, to prevent its heating, till ſuch time as there appears a red powder among it: this they ſeparate, by paſſing it through a ſieve, and then again ſpread abroad the grain on the linen, till they perceive the ſame redneſs of powder, when they repeat the ſifting: thus they proceed, while they diſcover any red powder on the ſurface of the grain, which is ſtill paſſing through the ſearce, till it yield no more.

In the beginning, when the ſmall red grains are found to move, as they will always do, they are ſprinkled over with ſtrong vinegar, and rubbed between the hands. Were not this precaution taken, out of every grain would be formed little inſects, which would be of no uſe in dyeing.

The grain being quite emptied of its pulp, or red powder, by the proceſs above-mentioned, is waſhed in wine, and then expoſed to the ſun; after this, it is put up into the huſks, formed into balls, and along with it the proportion of red duſt that it had afforded.

According to M. Marſigli's experiments, made at Montpellier, the kermes has the effect of galls, when mixed with vitriol; and makes a good ink: mixed with oil of tartar, or lime-water, its colour turns from a vermilion to a crimſon colour. In a decoction of turnſol flowers, it retains its proper colour. They have not been able to get any fixed eſſential ſalt from it; but a volatile ſalt it yields in abundance; which, in M. Marſigli's opinion, would have a better effect in medicine, if taken in a liquid, than when encloſed in conſerves and confections, which hinder its action.

Woollen cloth, prepared with alum and tartar, acquires, on being boiled with dry kermes berries, a durable deep red colour, called *ſcarlet in grain*, from the kermes having been formerly ſuppoſed to be the grain or ſeed of the tree; and *Venice ſcarlet*, from the greateſt quantities having been dyed there. This colour wants the luſtre and fire of the cochineal ſcarlet now in vogue, but in return is far more permanent, nor ſubject to be ſtained by dirt, or acrid liquors; and when ſpotted with greaſe, may be cleaned again without injury to the colour.

Mr. Hellot obſerves, that the figured cloths to be ſeen in the old tapeſtries of Bruſſels, and the other manufactures of Flanders, which have ſcarcely loſt any thing of their livelineſs in ſtanding for two hundred years, were all dyed with this ingredient; that, neverthleſs, kermes is at preſent entirely in diſuſe among the European dyers, though ſaid to be commonly employed in the Levant, and exported thither from Marſeilles in conſiderable quantities: that when the kermes ſcarlet (now called an ox-blood colour) is wanted for tapeſtries, &c. our dyers endeavour to imitate it with cochineal; that as the colour is difficultly hit with cochineal alone, they generally add a portion of Brazil wood; and that the dyes thus produced, though at firſt more vivid than they ought to be, often loſe their luſtre before a year is at an end, and turn white and grey in an extraordinary manner: that kermes might again be introduced to very good advantage, as its colour is of the moſt durable kind, and as ſundry ſhades are obtainable from it with leſs trouble and expence than from other drugs.

The ſame author has given a great number of experiments upon kermes, with different ſalts and metallic ſolutions. The principal of theſe are as follow:

On adding to the decoction of kermes a ſmall quantity of ſolution of tin, the dark colour of the liquor is immediately brightened, and prepared woollen dyed therein, inclines more to the orange than with the kermes alone. With this improvement of the colour, it receives the imperfections, though not all the beauty of the cochineal ſcarlet; all alcaleſcent ſubſtances ſtaining the cloth, that is, deſtroying the effect of the acid ſolution.

Kermes, with cream of tartar, and as much of the ſolution of tin as is employed for the cochineal ſcarlet (without any alum) dyed unprepared cloth of an extremely vivid cinnamon colour. On dipping the cloth in a ſolution of alum, a part of the red re-appeared, but was not beautiful.

With cream of tartar, ſolution of tin, and alum in larger quantity than the tartar, this drug gives purpliſh colours, which vary according to the proportions of the ingredients.

If vitriolated tartar be ſubſtituted to the alum and tartar; and if after the kermes has been boiled in a ſolution of a ſmall quantity of this ſalt, the ſtuff be boiled in this mixture for about an hour, the dye proves a beautiful kind of grey, in which the red is little perceived.

Glauber's ſalt, employed along with kermes, entirely deſtroys its redneſs, and gives an earthy grey colour. This dye is very periſhable, on account of the particular nature of the ſaline ſubſtance, by means of which the tinging particles are applied; for Glauber's ſalt diſſolves eaſily in cold water, and falls into a powder in the ſun's heat. This obtains equally in all dyes; thoſe drugs which afford moſt durable colours with tartar and vitriolated tartar, give very periſhable ones with the more diſſoluble and calcinable ſalts.

Green and blue vitriol, ſubſtituted ſeparately to alum, but taken in conjunction with cream of tartar, deſtroy likewiſe, or conceal the red colour of kermes, which in theſe two experiments has the ſame effect with galls, for it precipitates the iron of the green vitriol which tinges the cloth of a bright grey, and the copper of the blue, which gives a kind of olive dye. It likewiſe gave an olive dye with ſolution of copper made in aquafortis; a certain mark, that it poſſeſſes, like galls, an aſtringent precipitating quality. It is probably the aſtringency of kermes that renders its dye ſo durable; for all the barks, woods, roots, and other ſubſtances that are aſtringent, yield permanent colours.

White vitriol, employed with cryſtals of tartar, changes the red colour of kermes into a violet. A tincture of biſmuth ore, in ſpirit of nitre, and a ſolution of biſmuth itſelf made leiſurely in four times its weight of ſpirit of nitre, diluted with an equal quantity of water, gave alſo a violet dye upon white cloth. All acids convert it to a cinnamon colour, which inclines more or leſs to red, according as the acids are weak, and their quantity ſmall. Alkalies render its colour dull and dry. See Neumann's Chemiſtry, by Lewis, p. 508, &c.

To dye ſpun worſted with kermes, it is firſt boiled half an hour in water with bran; then two hours, in a freſh bath, with one-fifth of Roman alum, and one-tenth of tartar, to which ſour water is commonly added: after which it is taken out, tied up in a linen bag, and carried to a cool place, where it is left ſome days to obtain a full colour. As much kermes as equals three-fourths, or even the whole of the weight of the wool, is put into a warm bath, and the wool is put in at the firſt boiling. As cloth is more denſe than wool, either ſpun or in the fleece, it requires one-fourth leſs of the ſalts in the boiling, and of kermes in the bath. Leſs proportions of kermes will produce lighter and paler colours. If a ſucceſſion of ſhades be wanted, we muſt, as uſual, begin with the deepeſt. Hellot directs a ſmall handful of cot or refuſe wool to be thrown into the boiler in which the kermes is, and to let it boil a moment before the wool to be dyed is put in. This will abſorb a kind of black dregs, and the wool afterwards dipped will take a better colour. Before the wool that is juſt dyed is taken to the river, it may be dipped in a bath of water a little warm, in which a ſmall quantity of ſoap has been diſſolved. In this way the colour will acquire more brightneſs, though it will be rendered a little roſy, that is, will have a crimſon caſt. The colour imparted by kermes to wool, has much leſs bloom than the ſcarlet made with cochineal; whence the latter has been generally preferred, ſince the art of heightening its colour by means of ſolution of tin has been known. Berthollet.

Kermes *Mineral*, or, in modern language, the hydroſulphuret of antimony. The kermes mineral was a preparation of Glauber, which the king of France bought of M. de la Ligerie, and made public in 1720. That receipt was in the following form: take a pound of Hungarian antimony, broken into thin pieces, according to the direction of its ſpicula; four ounces of nitre, fixed by charcoal; and a pint of rain water; boil them two hours; then filtre the warm liquor, and when it cools, the kermes precipitates. The ſame antimony undergoes the ſame operations with the remaining liquor, to which three ounces of fixed nitre, and a pint of water are added. In a third boiling, two ounces of nitre, and a pint of water are to be added to the former lixivium. The kermes thus obtained is about a dram, and is well edulcorated by waſhing it with water, and burning ſpirit of wine on it; then it is dried for uſe.

Mr. Geoffroy ſhews, by many experiments, that the kermes is the reguline part of the antimony, joined to a ſort of hepar ſulphuris. He teaches us a much eaſier way of preparing this medicine, thus: Mix intimately the fine powder of two parts of antimony, and one of any fixed alkaline ſalt; melt thoſe metals in a crucible; then having powdered them while hot, boil them two hours in a large quantity of water; after this, paſs the hot liquor through paper, receiving it into a veſſel, in which there is hot water, the kermes ſeparates when it cools. The groſſer parts, which do not paſs through the paper, are to be boiled again, and filtrated as before; and the operation is to be repeated a third time, by which ſix or ſeven drams of kermes may be got out of every ounce of antimony. He ſays, he has ſeen effects like to thoſe of mild kermes from antimony, reduced to ſuch a fine powder, that none of the ſhining ſpicula are to be ſeen; and that the magiſtery of antimony, made by pouring ſpirit of nitre, or aqua regia, on the powder of antimony, and then edulcorating the maſs with water, has the ſame effects as kermes. Mem. de l'Acad. des Sciences, 1734, 1735. For the modern method of preparing it, ſee Antimony.

Half a grain, or a grain of this powder, given every three or four hours, produces no violent effects; but by increaſing the doſe, it may be made to vomit, purge, and ſweat.

When ſeven or eight grains are taken at once, it chiefly acts upon the primæ viæ, generally as an emetic and purgative. A doſe of three or four grains is ſeldom emetic, and more frequently purgative. When taken in theſe quantities as an evacuant, a little of it paſſes alſo into the viæ ſecundæ & tertiæ. When it is adminiſtered in ſmaller doſes, it paſſes almoſt entirely into the lacteal blood and lymphatic veſſels. In theſe it occaſions ſuch ſpaſms and oſcillations as it does in the primæ viæ; ſo that it increaſes all ſecretions and excretions, but particularly thoſe of urine, ſweat, and expectoration; according to the doſe, the nature of the diſeaſe, and the diſpoſition of the patient. It produces ſingularly good effects in thoſe diſeaſes of the breaſt which proceed from fulneſs and obſtruction. It may be adminiſtered in any vehicle, or incorporated in a bolus, with other ſuitable remedies. But it ſhould never be joined with acids, when it is deſigned to act as kermes.

Some commend this medicine as the moſt univerſal reſolvent and deobſtruent; aſſuring us, that it almoſt infallibly cures pleuriſies, peripneumonies, aſthmas, catarrhs, anginæ, ſmall-pox, and many other diſeaſes. Others are as poſitive, that it heats and thickens the blood, thereby increaſing obſtructions, and is particularly hurtful in all inflammatory diſeaſes.

This preparation was famous in France, and known by the name of *poudre des Chartreux*, becauſe a Carthuſian monk, who got it from M. de la Ligerie, firſt brought it into vogue. See Hiſt. de l'Acad. des Sciences 1720, and the Memoirs for the ſame year, where it is ſaid that Glauber was looked upon as the firſt inventor of this remedy. Its effects, like thoſe of many other antimonial preparations, are very various, which is frequently owing, as Mr. Geoffroy obſerves, to the different manner and care in making it. He adds that the more the kermes contains of a regulus eaſily revivified, the more it proves emetic. He alſo ſhews how to make a cinnabar with the kermes and mercury, and ſo diſengage the vitriolic acid from the kermes. See Mem. de l'Acad. des Sciences, 1734. This preparation of antimony is now diſuſed; and in its room the pharmacopeias have adopted the "Sulphur antimonii præcipitatum vel auratum;" for the method of preparing and adminiſtering which, ſee Antimony.

KERMISE, in *Geography*, a town of Arabia, in the province of Nedsjed; 65 miles S.S.E. of Jamama.

KERN, or Kerne, a term in the ancient Iriſh militia, ſignifying a *foot-ſoldier*.

Camden tells us, the armies of Ireland conſiſted of cavalry, called *galloglaſſes*; and infantry, lightly armed, called *kernes*. The kernes bore ſwords and darts; to the laſt were fitted cords, by which they could recover them after they had been launched out.

Kern, in the *Engliſh Salt-works*, a word uſed to ſignify the cryſtallizing, or ſhooting of ſalt in the brine, when ſufficiently evaporated in the boiling pan.

This word is alſo uſed by the ſeamen for the firſt coming of the bay-ſalt, made by the ſun's heat in the iſles of May, &c. See Salt.

Kern-*ſtone*, in *Natural Hiſtory*, a name given by the common people of many parts of England, to a peculiar ſort of ſtone, which is found on the ſides of hills in ſandy countries, where the hills are rocky. Pyran ſands afford a great many ſtones of this kind; and the manner of their formation is thus: the rocks in the ſides of the hills are continually covered over with the looſe ſand, which the winds toſs up, and the ſparry matter continually oozing out of the pores of theſe ſtones, with the wet, cements the grain of ſand together. When one cruſt is thus formed, another is ſoon added, and ſo on till the whole maſs is of a conſiderable thickneſs; and the ſpar ſtill ſerving as a general cement, the whole is held together, though but in a looſe way, yet ſo as to reſemble a ſort of ſtone. The little grains of ſand are ſtill viſible in all parts of this ſtone, and are what induced the people to call it kern-ſtone, as they call theſe *kerns*, or *kernels*. This account of the origin of the ſtone is eaſily proved, by putting a ſmall piece of it into aquafortis, for this diſſolves the ſpar, or cement, and the ſand is left looſe.

KERNES, in our *Laws*, ſignify idle perſons, or vagabonds.

KERNING, in *Letter-Foundery*. See *Letter* Foundery.

KERONA, in *Geography*, a town of Hindooſtan, in the circar of Gohud; 15 miles N. of Datteah.

KEROWLY, a town of Hindooſtan, in the country of Agra; 74 miles S.W. of Agra. N. lat. 26° 27′. E. long. 77° 28′.

KERPEN, a town of France, in the department of the Roer, and chief place of a canton, in the diſtrict of Cologne; 10 miles E.S.E. of Juliers. N. lat. 50° 25′. E. long. 6° 41′. The place contains 1515, and the canton 10,419 inhabitants, in 37 communes.

KERRAH, a town of Hindooſtan, in Guzerat, on the gulf of Cambay; 65 miles S.S.W. of Gogo.

KERRERA, one of the ſmaller weſtern iſlands of Scotland, near the coaſt of Argyle, where, in 1249, Alexander II. died, when he was endeavouring to wreſt the iſland out of the poſſeſſion of the Norwegians; 12 miles S. of Liſmore. N. lat. 56° 23′. W. long. 5° 32′.

KERRI, a town of the Arabian Irak, at the conflux of the Tigris and Euphrates; 50 miles N.W. of Baſſorah.

KERROO, a town of Hindooſtan, in Viſiapour; 12 miles N.W. of Baddammy.

KERRY, a county of the province of Munſter, Ireland, ſituated on the ſouth-weſtern coaſt of the iſland. It is bounded on the north by the river Shannon, which divides it form the county of Clare; on the eaſt by the counties of Limerick and Cork; on the ſouth-eaſt by the latter county; and on the ſouth-weſt and weſt by the Atlantic ocean. Its form is very irregular in conſequence of two great projecting tongues of land, compriſing the baronies of Iveragh and

Corcaguinny. It extends from north to ſouth 53 (67½ Engliſh) miles, and in the broadeſt part from eaſt to weſt 41 (52 Engliſh) miles; and contains 1012 ſquare miles, or 647,650 Iriſh acres, equal to 1,040,487 Engliſh acres. It thus appears to be the fifth county of Ireland in point of extent, though after Galway its population is the thinneſt, and it is one of the moſt backward in point of culture. The number of houſes, at the time Dr. Beaufort wrote, was, by return to the houſe of commons, 19,395, which at 5½ to a houſe, would be 107,000. This, however, falls much ſhort of the preſent population. The number of pariſhes is 83, all in the dioceſe of Ardfert and Aghadoe, but by unions they are reduced to 40 benefices, in which are 20 churches and only three glebe houſes. Indeed, in this county the number of Roman Catholics is greater, in proportion to that of Proteſtants, than in almoſt any other. The number of members which repreſent this county in the Imperial parliament is three, two knights of the ſhire, and one member for the borough of Tralee. "It is not ſurpriſing," ſays Dr. Beaufort, "that this county ſhould be thinly inhabited; barren mountains, and almoſt inacceſſible rocks, render a large portion of it unfit for habitation and incapable of culture. Even the northern baronies, in which there is much good land, with few mountains, are far from level; and the cheerful aſpect of cultivated fields and fine paſtures, is frequently interrupted by bleak and ſtony hills; while tracts of bog interſect the narrow plain that extends from Caſtleman harbour to the borders of the county of Cork, between the Mang and the Fleſk. Grazing is more attended to than tillage, and this part of Kerry ſupplies many fat beaſts of good ſize, and great numbers of ſtore cattle; but the native breed of the country is extremely ſmall, yet remarkably good for the pail, reſembling the Alderney cow both in ſize and character; butter is conſequently a conſiderable article among the exports of Kerry. The barony of Corcaguinny forms a peninſula between the bays of Dingle and Tralee, and terminates at Dunmore Head, the moſt weſtern point of Ireland and of Europe. It is full of mountains, but the high promontory of St. Brandon is eminent above the reſt, and the mountain of Cahircouree ſtands acroſs the iſthmus. Among the rough and high hills in the barony of Iveragh, and the ſouthern part of Dunkerron, ſome pleaſant vallies and improveable grounds are interſperſed; and in the iſland of Valentia, there are more inhabitants and a better culture than could be expected in ſo remote a ſpot. Glanerought is entirely covered with exceeding high and rugged hills, and ſeparated from the county of Cork by an immenſe and almoſt impaſſable ridge of rocky mountains; over which there is but one paſs, and that very difficult, called the Prieſt's Leap; but the loftieſt mountains in this county ſtand in a huge aſſemblage on the weſt and ſouth of Killarney, half encompaſſing the lower, and entirely ſurrounding the upper lake. Of theſe, Mangerton is generally eſteemed the higheſt, being 2500 feet above the ſea, but it is doubted whether the craggy ſummits of Macgillicuddy's rocks do not ſurpaſs it in altitude. In this deſolate tract, there are large herds of red deer, and abundance of game." To this account of Dr. Beaufort's, publiſhed almoſt 20 years ago, there is very little to be added. The ſtate of agriculture is ſtill very low, though a few gentlemen have turned their attention to the improvement of it. The barony of Iveragh, in particular, is in a very rude ſtate. It ſhould be noticed that the horſes of Iveragh are much eſteemed; they are a ſmall but an excellent breed, climbing over the moſt rugged rocks, and both aſcending and deſcending the ſteepeſt precipices with great facility and ſafety. They are ſtrong and durable, eaſily ſupported, and not ill-ſhaped; ſo hardy as to ſtand abroad all winter, and will browſe upon heath, furze, and other ſhrubs; and they have an eaſy, ambling gait. The principal lake is Lough Lane, generally called the lake of Killarney, for an account of which, ſee KILLARNEY. Many fine rivers water this county. The Caſhing, which is formed by the union of the Feele and the Gale, is navigable for eight or ten miles. The Lane flows out of the lake of Killarney, which receives the Fleſk. The Roughy pours its impetuous current into Kenmare river. The Mang, which is navigable to Caſtlemain, was the northern boundary of the ancient counts palatine of Deſmond, and falls into Caſtlemain harbour, at the bottom of the great bay of Dingle, which can only admit veſſels of moderate burden. Ventry bay, the roads of Dingle and Valentia, and Ballynaſkelig's bay, are ſmall but commodious harbours. Kenmare river is a ſecure and capacious haven. The principal towns are Tralee, where the aſſizes are held, Killarney, Milltown, and Dingle, for which ſee the reſpective articles under thoſe names. This county has ſeveral marble and ſlate quarries, and is not deſtitute of coal mines, but the abundance and cheapneſs of turf render them uſeleſs. The mines of copper, lead, &c. near Killarney will be noted under that head; iron was formerly obtained in great quantity, till the ſcarcity of timber put a ſtop to the works. The cider of Kerry, which is made of the cockagee apple, is highly prized, and brings a great price; yet orchards are not very numerous, and that valuable fruit, with another excellent apple, the Kerry pippin, are little propagated, and difficult to be procured. The original poſſeſſors of this county were the O'Connors, O'Sullivans, and, above all, the M'Carthys, who were kings of Munſter. The Engliſh families of Fitzmaurice and Fitzgerald early obtained ſettlements in it, and the head of the latter, who was created earl of Deſmond, had the part of the county ſouth of the Mang erected into a county palatine. The power of this family became very great, and the earls were often in oppoſition to the Engliſh government. In queen Elizabeth's time an act of attainder was paſſed, and all the poſſeſſions of the houſe of Deſmond were divided amongſt Engliſh ſettlers. From theſe ſome of the principal Proteſtant families are deſcended. Beaufort's Memoir of a Map of Ireland. Smith's Hiſtory of Kerry.

KERRY *Head*, a cape of Ireland, in the county of Kerry, at the ſouth extremity of the mouth of the river Shannon. Near this, very fine quartz cryſtals, both white, and amethyſt are found, and for ſome time the latter were in great requeſt. A ſet of ear-rings, a necklace, and other jewels compoſed of theſe amethyſts, were preſented to queen Caroline. This cape is in N. lat. 52° 24'. W. long. 9° 47'. This cape is ſometimes called Ballyheigh Head. Smith. Beaufort.

KERRY *Point*, or, according to M'Kenzie, Kenry, a cape of the county of Down, Ireland. N. lat. 54° 22'. W. long. 5° 22'.

KERS, a town of Tyrol, on the river Inn; 12 miles N.E. of Landeck.

KERSCHAN, a town of Iſtria; 16 miles N.N.E. of Pedena.

KERSEY, JOHN, in *Biography*, an able mathematician and philologiſt, who flouriſhed towards the cloſe of the ſeventeenth, and beginning of the eighteenth centuries, and is chiefly known in the ſcientific world by his "Elements of Algebra," in two vols. folio, which is an ample and complete work, containing a full explanation of the problems of Diophantus: he was author likewiſe of "Dictionarium Anglo-Britannicum, or General Engliſh Dictionary."

Kersey, a kind of coarſe woollen cloth, made chiefly in Kent and Devonſhire.

KERSHAW, in *Geography*, a diſtrict of South Carolina, on Wateree river, which ſeparates it from Richland diſtrict; 35 miles long, and 30 broad, containing 7340 inhabitants, of whom 2530 are ſlaves.

KERUA, a town of Perſia, in the province of Kerman; 90 miles S.S.W. of Sirgian.

KERVIKER, a town of Natolia; 28 miles S.W. of Aphiom-kara-hiſſar.

KERUN, a lake of Egypt, in a diſtrict forming a kind of excreſcence to the weſt, about 30 miles long, and ſix broad; which has no appearance of being artificial.

KERYE', a town of Hindooſtan, in Baglana; 25 miles W. of Naſſuck.

KESALAX, a town of Sweden, in the government of Kuopio; 84 miles S.S.E. of Kuopio.

KESAVA, in *Mythology*, a name of the Hindoo deity Viſhnu; and of his principal avatara or incarnation of Kriſhna, and is ſaid to refer to the beauty of his hair. The name is alſo written Keſavi, and ſometimes pronounced Keſſu. Budha, or Viſhnu in that avatara, is alſo ſometimes addreſſed as Keſava.

KESAW, in *Geography*, a town of Hindooſtan, in Bahar; 48 miles S.S.W. of Patna.

KESBAH, a town of Bengal; 23 miles S.S.E. of Moorſhedabad.

KESCHIM, or Kesem, a ſea-port town of Arabia, in the province of Hadramaut, and the reſidence of a ſovereign prince. Its inhabitants are ſaid to be highly civilized, and to receive all ſtrangers hoſpitably. The Engliſh ſometimes viſit this harbour. The ſcheick of Keſchim is ſometimes called king of Fartak; and his dominions comprehend a conſiderable number of cities, among which is that of Fartak. Beſides his poſſeſſions on the continent, the ſcheick of Keſchim is likewiſe head of the iſland of Soccatra, famous for its aloes. N. lat. 15° 20′. E. long. 50° 2′.

KESELBAUDEN, a town of Bohemia, in the circle of Konigingratz; 18 miles N.N.E. of Gitſchin.

KESELDORF, a town of Bohemia, in the circle of Konigingratz; 10 miles E. of Gitſchin.

KESH, Kech, or *Sebz*, a town of Grand Bucharia, and capital of a diſtrict, of which Timur Bec was governor in 1360. This town was famous on account of its univerſity for the ſtudy of ſciences and law. It was the ordinary ſummer reſidence of Timur, and declared by him to be the ſecond ſeat of his empire: he encompaſſed it with walls, and built a new palace in 1379. It was alſo called "Chaber-Sebz," or the green city, from the verdure of the gardens and meadows celebrated for rare and beautiful plants; and alſo "Coubbet Elilmi Veladeb," which ſignifies the dome of ſcience and virtue; 30 miles S. of Samarcand. N. lat. 39° 10′. E. long. 64° 10′.

KESHAM, a town of Grand Bucharia; 70 miles W.S.W. of Badakſhan.

KESHIK-DAG. See Olympus.

KESHO, Kecho, or *Kacho*, a city of Aſia, capital of the kingdom of Tonquin and the royal reſidence, is ſituated upon the navigable river Songkoy, or San Koy, about 40 leagues from the ſea, and about 21° N. lat. With regard to ſize it may be compared with the moſt celebrated cities of Aſia, and may at leaſt equal that of Paris. On the 1ſt and 15th days of every moon are held great markets, which attract moſt of the inhabitants of the ſurrounding towns and villages to a conſiderable diſtance. The crowd is there ſo immenſe, that, though the ſtreets be very wide, it becomes difficult to advance 100 paces in half an hour. Yet great order prevails, each merchandize and village having diſtinct ſtreets for the expoſure of their articles. The ſtreets are paved with brick, except ſome parts which are left for the paſſage of horſes, elephants, and the king's carriages. Two-thirds of the houſes are of wood, others of brick, among which are the factories of foreign merchants, diſtinguiſhed amidſt a multitude of huts conſtructed of bamboos and clay. The palaces of the Mandarins, and the public buildings, which occupy large ſpaces of ground, are chiefly built with wood in a neat and ſolid manner, and decorated with ſculptures and paintings. The roofs conſiſt of tiles of different colours. The common houſes are compoſed of a roof placed on wooden columns, commonly covered with ſtraw, reeds, or large leaves of trees, which, accidents excepted, will laſt 30 or 40 years. Theſe houſes have no cielings or ſtories, but are divided by partitions, on a ground floor; and the numerous windows are covered with gauze, or fine muſlin, glaſs being almoſt unknown. This conſtruction being very liable to take fire, the police only permits it to be lighted during certain hours of the day. The trade is very conſiderable; and the great river is crowded with barks and boats, conveying the merchandize of the provinces to the capital. Each boat pays about two-pence for the right of anchorage, and this ſmall tax forms a conſiderable revenue. The royal palace occupies a conſiderable ſpace in the fineſt quarter of the city, ſituated amidſt groves, gardens, and canals, and difficult of acceſs. The women and eunuchs never quit its precincts. Before a recent revolution, the triple walls of the ancient city and palace, the courts paved with marble, and other features of grandeur, diſplayed one of the moſt beautiful and vaſt edifices of Aſia; for the circumference of the palace and gardens is ſaid to have been from ſix to ſeven French miles. At preſent the capital is only defended by a quick hedge of bamboos. In the neighbourhood is quartered a body of ſoldiery; the arſenal and other magazines of ammunition being on the banks of the river. On the other ſide is the Chineſe town, eſtabliſhed by precaution; nor are other ſtrangers allowed to enter the city without a ſpecial permiſſion. Abbé Richard cited in Pinkerton's Geography, vol. ii.

KESI, in *Hindoo Mythology*, a monſter ſlain by Viſhnu, or Kriſhna.

KESIRMAK, in *Geography*, a town of Poland, in the palatinate of Braclaw, near the Dneiſter; 72 miles S. of Braclaw.

KESITAH. This word is to be met with in Geneſis, and in Job; and is tranſlated in the Septuagint and Vulgate, ſheep or lambs. But the Rabbins and modern interpreters are generally of opinion, that Keſitah ſignifies rather a piece of money. Bochart and Eugubinus are of opinion the Septuagint meant *minæ*, and not *lambs*; in Greek *hecaton mnon*, εκατον μνων, inſtead of εκατον αμνων. Now a mina was worth ſixty Hebrew ſhekels, and conſequently ſix pounds ſixteen ſhillings and ten-pence halfpenny ſterling; or nine pounds Engliſh, ſuppoſing, as Dr. Prideaux does, that a ſhekel is worth three ſhillings. M. de Pelletier of Rouen is of opinion, that Keſitah was a Perſian coin, ſtamped on one ſide with an archer, (*Keſitah*, or *Keſeth*, in Hebrew ſignifying *a bow*,) and on the other with a lamb; that this was a gold coin known in the Eaſt by the name of a Daric, and was in value about twelve livres and ten-pence French money. A Daric is a piece of gold, worth, as Dr. Prideaux ſays, five and twenty ſhillings Engliſh. Several learned men, without mentioning the value of the Keſitah, ſay it was a ſilver coin, the impreſſion whereof was a ſheep; for which reaſon the Septuagint and Vulgate tranſlate it by this name. Calmet is of opinion, that Keſitah was a purſe of gold, or ſilver. In the Eaſt they reckon at preſent by purſes: a purſe in Perſia conſiſting of 50 tomans, which make 2518 penny

piece

pieces of French money. The word *kiſta* in Chaldee ſignifies a meaſure, or veſſel. And Euſtathius ſays that kiſta is a Perſian meaſure. Jonathan and the Targum of Jeruſalem tranſlate Keſitah, a pearl. Gen. xxxiii. 19. Job, xlii. 11. See his Connect. P. I. p. 101. See Calmet Comment. upon Gen. xxxiii. 19. Gen. xxv. 12. Job, xlii. 2, &c. and Dict. Bibl.

KESKER, or Kurab, in *Geography*, a town of Perſia, in the province of Ghilan, on the coaſt of the Caſpian ſea; 25 miles N.W. of Reſhd.

KESOCOTTY, a town of Thibet; 40 miles S. of Gangotri.

KESON, a town of Hindooſtan, in Lahore; 25 miles E.N.E. Jullindar.

KESSELDORF, a town of Saxony, in the margraviate of Meiſſen; ſeven miles W. of Dreſden.

KESTEN, a town of Syria; 25 miles W. of Aleppo.

KESTENUS, a town of Aſiatic Turkey, in Natolia; 20 miles S. of Amaſieh.

KESTREL, the Engliſh name of a hawk, called alſo the *ſtannel* and the *windhover*, and by authors the *tinnunculus* and *cencris*. It builds with us in hollow oaks, and feeds on partridges and other birds.

KESWICK, in *Geography*, a market town in the ward of Allerdale, in the county of Cumberland, England, is ſituated near the lower end of Derwentwater, on the eaſtern ſide of the extenſive and beautiful vale of Keſwick. The town conſiſts of one long ſtreet: the houſes are of ſtone, and were returned under the late population act at 290; the number of inhabitants 1350. A cotton factory has lately been eſtabliſhed here; coarſe woollen goods, carpets, blankets, kerſeys, and ſome linens are alſo manufactured in the town and its vicinity. The chief trade is derived from the influx of travellers viſiting the lakes: by whom Keſwick, from its central ſituation, is much frequented; the number in one ſeaſon, the ſummer of 1793, amounting to 1540 A weekly market is held on Saturdays; and a fair for cattle every fortnight from May to October. In this town two muſeums, collected by private perſons, are open for public inſpection; they contain ſpecimens of almoſt every variety of the mineralogical ſubſtances of Cumberland, with many kinds of foſſils, plants, antiques, and other curioſities. Keſwick is diſtant from London 291 miles.

About two miles to the ſouth of the town, on an eminence called Caſtle Rigg, is a Druidical arrangement of ſtones, ſome ſtanding upright, ſome fallen, and others leaning obliquely: the whole number is fifty; of which forty are diſpoſed in an oval form, thirty paces by thirty-two in diameter; the other ten compoſe a receſs or long ſquare within the area on the eaſt ſide, in conjunction with the ſtones of the oval; this is ſeven paces in length, and three in width. One ſtone is more than ſeven feet high, others exceed five feet; but the greater number are ſmaller. Weſt's Guide to the Lakes. Houſeman's Tour. Hutchinſon's Hiſtory, &c. of Cumberland. Beauties of England, vol. iii.

KET, William, in *Biography*, a tanner of Norfolk, who, in the regn of Edward VI. inſtigated a revolt againſt the government. The populace were at firſt excited by the complaints againſt incloſures, but finding their numbers increaſe, and already amounting to 20,000 ſtrong, they grew inſolent, and proceeded to more exorbitant pretenſions. They demanded the ſuppreſſion of the gentry; the placing of new counſellors about the king, and the re-eſtabliſhment of the Popiſh religion. Ket aſſumed the government over them, and exerciſed his brief authority with the utmoſt arrogance. Having taken poſſeſſion of Monſhold-hill, near Norwich, he erected his tribunal under the branches of an old ſpreading oak, thence denominated the Oak of Reformation, and ſummoning the gentry to appear before him, he gave ſuch decrees as might be expected from his character and ſituation. At length the earl of Warwick was ſent againſt the rebels, and put them to flight. Two thouſand fell, either in the action, or purſuit: Ket was taken and hanged at Norwich caſtle: nine of his followers ſuffered the like puniſhment on as many boughs of the Oak of Reformation, and the inſurrection was thus entirely ſuppreſſed in 1549. Hume.

KETAH, in *Geography*, a town of Hindooſtan, in Allahabad; 11 miles N. of Jionpour.

KETALEAH, a town of Hindooſtan, in Bahar; 74 miles S.S.W. of Patna. N. lat. 24° 38′. E. long. 84° 36′.

KETCH, in the *Marine*, is a veſſel with two maſts. The maſts are placed and rigged with ſails, as the main and mizen-maſts of a ſhip. Upon the bowſprit, and between that and the main-maſt, they have ſtayſails, and a very large jib. Formerly bomb-veſſels and yachts were thus rigged, as ketches, but of late years as ſhips. At preſent only a few coaſting veſſels are rigged ketch faſhion.

KETCHAR-TCHOU, in *Geography*, a town of Thibet; 10 miles S. of Giti.

KETCHENG-TASE Tartars, a tribe of Tartars who inhabit the territory of Chineſe Tartary, that lies on both the banks of the river Saghalien-Oula, and extends as far as the eaſtern ſea. Their country, which is almoſt 150 leagues in length, contains only ſmall villages, moſt of which are ſituated on the banks of the river. The language of theſe Tartars is different from that of the Mantchews, and is diſtinguiſhed by the name of "Fiatta." It is probably the ſame which is ſpoken by the other more northerly Tartars, who live beyond the mouth of the river Saghalien.

The Tartars of Ketcheng-taſe do not ſhave their heads, as other people of the empire. They wear their hair tied in a knot with a ribband, or encloſed in a bag behind. They appear to be leſs clowniſh than the Yupi-taſe Tartars. They employ much of their time in hunting ſables, and are obliged to pay a certain number of their ſkins in tribute.

KETCHICTEN, or Kesicten, a country of Chineſe Tartary, divided into two ſtandards. N. lat. 43°. E. long. 117° 38′.

KETEMBER, a ſmall iſland in the Eaſt Indian ſea, S. lat. 6° 12′. E. long. 132° 53′.

KETMEBEH, a town of Natolia; 27 miles E. of Pergamo.

KETMIA, in *Botany*, the Syrian appellation of the ſhrub commonly called *Althæa frutex*, *Hibiſcus ſyriacus* of Linnæus. Tournefort, in his *Inſtitutiones*, 99, t. 26, adopts it for the whole genus of *Hibiſcus*; ſee that article. Some ſpecies of *Bombax* and *Hermannia* have alſo occaſionally been called by this name.

KETOI, in *Geography*, one of the Kurile or Kurilſkoi iſlands, in the N. Pacific ocean. This iſland is 30 verſts in length, and about 10 in breadth. On it are ſeen high mountains, with their white rocky walls and ſummits: at the foot of theſe, and in the vallies, are foreſts of birch, alder, the ſorbus ſylveſtris aucuparia, and ſeveral ſpecies of pines. The iſland nouriſhes white, black-bellied, and red foxes. The ſea animals are not plentiful. It is uninhabited. N. lat. 48° 45′. E. long. 153° 38′.

KETRAN, Kitran, or *Alketran*, a name given by ſome of the Arabian authors to the oil of cedar, called by the Greeks *cedria*. We have of later times formed the word *cedranum* upon this, and it has ſince been applied to the zopiſſa of the ancients, a compound made of pitch and wax melted together, and uſed for covering the bottom of ſhips.

KETSIO, in *Geography*, a town of Sweden, in the province of Smaland; 40 miles N.W. of Wexio.

KETSKOI, a town of Ruſſia, in the government of Tobolſk, ſeated on the river Ket, which runs into the Oby at Narim; 64 miles S.E. of Narim.

KETSKEMET, a town of Hungary; 92 miles E. of Caniſcha.

KETTERING is a populous market-town, ſituated on an eaſy aſcent, in the hundred of Huxloe, Northamptonſhire, England. In the time of the Saxons, it was called Cytringan and Kateringes: the lordſhip was granted by king Edwy, in the year 976, to his ſervant Elfſige. The church, which compriſes a nave, north and ſouth aiſles, and a chancel, has a handſome tower and ſpire at the weſt end. The tower conſiſts of three ſtories, in each of which are large windows, or window frames, of ſeveral compartments: the angles are flanked with double buttreſſes: under the embattled parapet runs an ornamented faſcia, and at each corner is raiſed a ſmall hexangular embattled turret; the whole ſurmounted by a handſome hexagonal crocketted ſpire, with three windows, diminiſhing in their ſize upwards, on the alternate ſides. The following quaint prophetic promiſe is inſcribed in this church: "Who ſo redis mi name ſhal have Godys blyſſing and our lady; and my wyſis doo ſey the ſame." Excepting the church, Kettering has nothing to attract or intereſt the antiquary. Near the middle of the town is a ſpacious area, ſurrounded by ſome private houſes and ſhops of reſpectable appearance. Here are a ſeſſions-houſe, and a well endowed free-ſchool; alſo an alms-houſe for ſix poor widows, and two diſſenting meetings. By the returns made to parliament in 1801, the number of houſes appears to be 641; of inhabitants, 3011; of which number 1770 were reported as employed in various trades and manufactures, and 221 in agriculture. The chief manufactures are thoſe of lace-working, wool-combing, and the ſpinning and weaving of tammies and laſtings. Kettering is 16 miles diſtant from Northampton, and 74 from London; has a well ſupplied weekly market on Fridays, and four annual fairs.

Kettering was the birth-place of Dr. John Gill, a diſſenting miniſter of diſtinguiſhed eminence, through the greater part of the laſt century. He was one of thoſe ſelf-taught ſons of genius, who, by overcoming what are too often conſidered inſurmountable obſtacles in literature, aſtoniſhed the world by the variety and extent of their acquiſitions. See Gill, John.

In the vicinity of this town, to the weſtward, in a road called Staunch Lane, are found what are denominated *kit-cats*, a kind of pellucid ſtones, apparently vitrifications. Theſe, when pulverized, are conſidered ſingularly efficacious as a ſtyptic, and are conſequently much eſteemed. They are frequently diſcovered near the ſurface of the ground, but more uſually in the argillaceous ſtrata, dug for making brick. In a ſpot, named Stony-lands, between Kettering and Weekly woods, in quarrying for ſtones, were found urns, bones, coins, and other antiquities. Bridge's Hiſtory of Northamptonſhire. Beauties of England, vol. xi.

KETTLE Falls, a cataract on the river Utwas, in Canada; 90 miles W. of Montreal.

Kettle *River*, a river of Canada, which runs into lake Erie, N. lat. 43°. W. long. 80° 51′. See Chaudiere.

Kettle, in the *Art of War*, a term the Dutch give to a battery of mortars, becauſe it is ſunk under ground.

Kettle-*Drums*. See Drum.

The kettle-drum, with trumpets, is the moſt martial ſound of any; each regiment of horſe formerly had a pair.

The kettle-drummer rides always at the head of the ſquadron, and his poſt is on the right when the ſquadron is drawn up.

The kettle-drum, belonging to the royal regiment of artillery, is mounted on a ſuperb waggon, richly gilt and ornamented, and drawn by four white horſes, elegantly capariſoned, with a ſeat for the drum-major general.

KETTLEWELL, John, in *Biography*, was born at North-Allerton, in the county of York, in the year 1653. Here he received the elements of a learned education, and in 1670 was entered a ſervitor at St. Edmund Hall, in the univerſity of Oxford. Having taken the degree of B.A. he was choſen a fellow of Lincoln-college, and became eminent as a tutor in that ſociety. He took the degree of M.A. in 1677, entered holy orders, and became celebrated for his uſeful and inſtructive mode of preaching, and alſo for his great theological knowledge. In the year 1681, he publiſhed "Meaſures of Chriſtian Obedience, &c. for the Promotion of the Piety and Peace of troubled Conſciences," which procured the author a high degree of reputation as a practical and controverſial writer. It was dedicated to Dr. Compton, biſhop of London, but when that prelate took an active part in the meaſures that terminated in the abdication of James II. Mr. Kettlewell ordered the dedication to be eraſed from all the copies of the work which were unſold, and directed it to be omitted in future editions. The work itſelf induced the counteſs of Bedford to appoint him one of her domeſtic chaplains, and it procured for him the patronage of lord Digby, who, in 1682, preſented him with the living of Coleſhill, in Warwickſhire. On this living he continued to diſcharge the duties of the paſtoral office, much eſteemed and reſpected, till the year 1690, when he was deprived for refuſing to take the oaths of ſupremacy to king William and queen Mary. After his deprivation he removed to London, where he chiefly aſſociated with gentlemen, who entertained ſimilar ſentiments with thoſe which he himſelf avowed. In conjunction with Mr. Robert Nelſon he concerted "a model of a fund of charity for the needy ſuffering, that is, the nonjuring clergy." He died of a conſumption in 1695, when in the 42d year of his age. "He was," ſays his friend, "learned without pride, wiſe and judicious without cunning: he ſerved at the altar without either covetouſneſs or ambition: he was devout without affectation: ſincerely religious without moroſeneſs: courteous and affable without flattery, or mean compliances: juſt without rigour: charitable without vanity, and heartily zealous for the intereſt of religion without faction." His works, which are numerous, were publiſhed in 1718, in two vols. folio. Biog. Brit.

KETU, in *Hindoo Mythology*, is the regent of the deſcending node, or the dragon's tail. The following legend on this ſubject is from Moor's Hindoo Pantheon, p. 282. "Rahu was the ſon of Kaſyapa and Diti (ſee Kasyapa), according to ſome authorities; but others repreſent Sinhika (perhaps the Sphinx) as his natural mother. He had four arms; his lower parts ended in a tail, like that of a dragon, and his aſpect was grim and gloomy, like the *darkneſs* of the chaos, whence he had alſo the name of Tamaſa. He was the adviſer of all miſchief among the Daityas, or evil ſpirits, and his chief delight was to ſow diſſention among the Devatas, or beneficent deities. When the gods had produced the Amrita, or elixir of immortality, by churning the ocean (ſee Kurmavatara), he diſguiſed himſelf like one of them, and received a portion of it; but the Sun and Moon diſcovering the fraud, Viſhnu ſevered his head and two of his arms from the reſt of his monſtrous body. That part of the nectareous fluid, that he had time to ſwallow, ſecured his immortality; his trunk and dragon-like tail fell on the mountains of Malaya, where Mini, or Brahman, carefully preſerved them by the name of Ketu; and, as if a complete body had been formed from them, like a diſmembered polype, he is ſaid to have adopted Ketu as his own child. The head, with two arms, fell on the ſands of Barbara, where Pithenas was then walking with his wife Sinhika: they carried the Daitya to their palace, and adopted him as their ſon. This extravagant tale is no doubt aſtronomical; Rahu and Ketu being the *nodes*, or what aſtrologers call the head and tail of the dragon. It is added, that they appeaſed Viſhnu, and obtained re-admiſſion to the firmament, but were no longer viſible from the earth, their enlightened ſides being turned from it; that Rahu ſtrives, during eclipſes, to wreak vengeance on the Sun and Moon who detected him; and that Ketu often appears as a comet, a whirlwind, a fiery meteor, or water-ſpout, or a column of ſand. Fifty-ſix comets are ſaid, in a book called Chintamani, to have ſprung from Ketu; and Rahu had a numerous progeny of Grahas, or crocodiles." A plate of the Hindoo zodiac includes Rahu and Ketu, the latter appearing merely as a head of a black colour, handſomely ornamented, and reſting againſt a pillow. In a plate of the Indian zodiac, publiſhed by ſir W. Jones in the ſecond volume of the Aſiatic Reſearches, Ketu is mounted on a frog; the meaning of which, if it have any, has not been explained. See Rahu.

KETVER, in *Geography*, a town of Grand Bucharia, on a mountain, taken by Timur Bec in 1398; 100 miles S. of Badakſhan.

KETZIN, a town of Brandenburg, in the Middle Mark; 8 miles N.W. of Potzdam.

KETZLDORF, a town of Bohemia, in the circle of Chrudim; 12 miles S.E. of Leutiniſchl.

KEVALCOTTY, a town of Thibet; 18 miles N.W. of Sirinagur.

KEVEL of Buffon, in *Zoology*, *Antilope Kevella* of Linnæus, *Ahy* of Kæmpfer, and *flat-horned antelope* of Pennant, has large horns, which are flattened, and bent in form of a lyre; the fur is yellowiſh, with pale ſtreaks, and a dark coloured band runs along each ſide. This animal inhabits Barbary, Senegal, and Perſia. It is about the ſize of a ſmall roe; lives in large flocks, and, like moſt ſpecies of the genus, is reckoned very delicate food, though it has a muſky odour when alive. In both ſexes the horns are ſurrounded with prominent rings, uſually from 14 to 18, except the ends, which are ſmooth: they are bent in the ſame manner with thoſe of the antilope dorcas, and in general the two animals reſemble each other very much, except that the horns of this ſpecies are flattened, and have a greater number of rings.

KEVELS, or Chevils, in a *Ship*, are two pieces of timber nailed to the inſide of a ſhip, from whence the upper ends branch outward into arms or horns, ſerving to belay the great ropes, by which the bottoms of the mainſail and foreſail are extended.

KEUKZER, in *Geography*, a town of Perſia, in Farſiſtan; 40 miles S. of Jezdkaſt.

KEULA, a town of Germany, in the county of Schwartzburg; 11 miles N. of Mulhauſen.

KEURA, in *Botany*, Forſk. Ægypt. Arab. 172. Thunb. Nov. Gen. 35. See Kaida and Pandanus.

KEURBOOM River, in *Geography*, a river on the S. coaſt of the colony of the Cape of Good Hope, which, like the Knyſna, runs up into the midſt of tall foreſts, and might be navigated by boats to a conſiderable diſtance; but its mouth, in Plettenberg's bay, is completely ſanded up by the almoſt perpetual rolling ſwell of the ſea, from the ſouth-eaſtward upon the ſandy beach.

KEURN, a town of Sweden, in the government of Waſa; 96 miles S.E. of Waſa.

KEVROL, a town of Ruſſia, in the government of Archangel; 100 miles S.E. of Archangel.

KEUSCHBERG, or Kiade, a town of Saxony, remarkable for a victory obtained by Henry the Fowler over the Huns, in 933; 6 miles S.E. of Merſeburg.

KEW, a village and pariſh in the hundred of Kingſton, and county of Surry, England, is pleaſantly ſeated on the ſouthern banks of the river Thames, at the diſtance of 6½ miles weſtward of London. In the year 1800 it contained 85 houſes, and 424 inhabitants. Previous to the year 1769, this place was only a hamlet to Kingſton, but in that year an act of parliament was obtained to unite this and Peterſham in one vicarage. The neighbouring inhabitants then ſubſcribed to build a chapel on a piece of land given by queen Anne. In this is a tablet to the memory of Jeremiah Meyer, a celebrated miniature painter; and in the adjoining cemetery repoſe the remains of Thomas Gainſborough, an artiſt of diſtinguiſhed merit. (See Gainsborough.) Over the Thames, at this place, is a handſome ſtone bridge of ſeven arches, built from a deſign by Paine. It was opened in 1789, and is private property; to defray the expences of which a toll is exacted from all perſons, carriages, horſes, &c. paſſing over it. In this village is one of the royal palaces, which is held on leaſe. It is a ſmall houſe, in a bad ſtyle of architecture, and in a flat, confined ſituation; yet, from its contiguity to the fine and intereſting gardens of Kew, has continued a royal reſidence for many years. His preſent majeſty, George III. has commenced a new palace upon a larger ſcale; but the works have been long ſuſpended, and it is not improbable that both theſe ſtructures may be utterly deſerted by the next monarch. It is built from deſigns of James Wyatt, eſq. The gardens of Kew are the pride and ornament of the place. They are compriſed in 120 acres of land, and are planted with almoſt every ſpecies of exotic tree, ſhrub, and plant that can be preſerved alive in this country. Sir William Chambers publiſhed a particular account of theſe gardens, and of the various ornamental buildings within them; but ſince ſir William's deceaſe many additions and improvements have been made to the exotic garden. The late Mr. Aiton, gardener, gave ſome account of the rare plants, &c. cultivated here, in a work, entitled "Hortus Kewenſis." The following are the names and dates of the different buildings erected by ſir William Chambers within theſe gardens: The Orangery, or Greenhouſe, built in 1761, is 145 feet long, 30 feet wide, and 25 feet high. In the ſame year, and near the ſame building, was erected "The Temple of the Sun," partly reſembling one of the temples of Balbec. In the Flower Garden is an "Aviary," and near it a "Menagerie," with a pavilion deſigned in imitation of a Chineſe opening. Contiguous to this ſtands "The Temple of Bellona," built in 1760, of the proſtyle kind, with portico tetraſtyle Doric. In a ſolitary walk, near the lake, is "The Temple of the God Pan," of the monopterous kind, of the Doric order, built in 1758. On an eminence ſtands "The Temple of Eolus," of ſimilar figure with the preceding. Not far from this, at the head of the lake, is a Chineſe octagon, of two ſtories, called "The Houſe of Confucius," built from deſigns by Goupy. Paſſing hence through a winding ſhady walk, the ſtranger is next conducted to a Corinthian colonnade, called "The Theatre of Auguſta," built in 1760. "The

Temple of Victory" is the next object, executed in 1759, in commemoration of a victory obtained by prince Ferdinand of Brunſwick, in that year. The Alhandra is imitative of a moreſque building; and the great Pagoda is built in imitation of the Chineſe Taa. The baſe is a regular octagon of 49 feet in diameter, and the elevation is compoſed of 10 priſms, or 10 ſtories, and is 163 feet in height. The other buildings are called the Moſque, the Gallery of Antiques, the Temple of Arethuſa, and the Ruin. The Gardens at Kew are opened every Monday during the ſummer. Lyſons's Environs of London.

KEWAN, a town of Hindooſtan, in the circar of Kitchwara; 10 miles W. of Sheergur.

KEWEH, a town of Natolia, on the Sakaria; 24 miles E. of Iſnik.

KEXHOLM, a town of Ruſſia, in the government of Viborg, built on two iſlands at the mouth of a river, on the ſide of lake Ladoga. The houſes are conſtructed of wood, but the town is well fortified, and defended by a citadel; 40 miles E.N.E. of Viborg. N. lat. 61°. E. long. 29° 50′.

KEXLEBODA, a town of Sweden, in the province of Smaland; 36 miles S.S.W. of Wexio.

KEY, Great, a ſmall iſland in the Eaſt Indian ſea, about 50 miles long, and from 5 to 12 broad. S. lat. 5° 24′. E. long. 133° 28′.

Key, *Little*, an iſland in the Eaſt Indian ſea, about 60 miles in circumference. S. lat. 5° 52′. E. long. 133° 12′.

Key, a little iron inſtrument for the opening of locks.

L. Molinus has a treatiſe of keys, "De Clavibus Veterum," printed at Upſal. He derives the Latin name *clavis* from the Greek κλειω, *claudo, I ſhut;* or from the adverb *clam, privately;* and adds that the uſe of keys is yet unknown in ſome parts of Sweden.

The invention of keys is owing to one Theodore of Samos, according to Pliny and Polydore Virgil; but this muſt be a miſtake, the uſe of keys having been known before the ſiege of Troy: mention even ſeems to be made of them in the nineteenth chapter of Geneſis.

Molinus is of opinion, that keys, at firſt, only ſerved for the untying certain knots, wherewith they anciently ſecured their doors; but the Laconic keys, he maintains, were nearly akin in uſe to our own: they conſiſted of three ſingle teeth, and made the figure of an E; of which form there are ſtill ſome to be ſeen in the cabinets of the curious.

There was alſo another key, called βαλαναγρα, made in the manner of a male ſcrew, which had its correſponding female in a bolt affixed to the door.

Key is hence become a general name for ſeveral things ſerving to ſhut up or cloſe others.

Key, or *Key-ſtone, of an Arch, or Vault,* is the laſt ſtone placed atop thereof; which, being wider and fuller at the top than the bottom, wedges as it were, and binds in all the reſt.

The key is different in the different orders; in the Tuſcan and Doric, it is a plain ſtone, only projecting; in the Ionic, it is cut, and waved ſomewhat after the manner of conſoles; in the Corinthian and Compoſite, it is a conſole enriched with ſculpture, foliages, &c.

M. Belidor makes the thickneſs of the arch-ſtones of a bridge, one twenty-fourth part of the width of the arch; but Mr. Gautier, another experienced engineer, makes their length, in an arch twenty-four feet wide, two feet; in arches, forty-five, ſixty, ſeventy-five, ninety wide, three, four, five, ſix feet, reſpectively: and it is obſerved by Mr. Muller, that the thickneſs allowed by Belidor is not ſufficient to prevent the weight of the arches from cruſhing the key-ſtones to pieces by their preſſure againſt one another. Muller's Pract. Fortif. p. 253.

The name key-ſtones, or arch-ſtones, is ſometimes alſo given to all the ſtones which form the ſweep of an arch, or vault, anſwering to what the French more diſtinctly call *vouſſoirs.*

Key is alſo uſed for the eccleſiaſtical juriſdiction; particularly for the power of excommunicating, and abſolving. The Romaniſts ſay, the pope has the power of the keys, and can open and ſhut paradiſe as he pleaſes; grounding their opinion on that expreſſion of Jeſus Chriſt, "I will give thee the keys of the kingdom of heaven."

In St. Gregory we read, that it was the cuſtom heretofore, for the popes to ſend a golden key to princes, wherein they always encloſed a little of the filings of St. Peter's chains, kept with great devotion at Rome; and that theſe keys were worn in the boſom, as being ſuppoſed to contain ſome wonderful virtues.

Key, in *Muſic,* is a certain fundamental ſound, or tone, to which the whole piece, be it concerto, ſonata, cantata, &c. is accommodated; and with which it uſually begins, but always ends.

To get an idea of the uſe of the key, it may be obſerved, that as in an oration there is a ſubject, *viz.* ſome principal perſon or thing, to which the diſcourſe is referred, and which is always to be kept in view, that nothing unnatural and foreign to the ſubject may be brought in; ſo in every regular piece of muſic, there is one note, *viz.* the key, which regulates all the reſt. The piece begins and ends in this; and this is, as it were, the muſical ſubject, to which a regard muſt be had in all the other ſounds of the piece. Again, as in an oration there are ſeveral diſtinct articles, which refer to different ſubjects, yet ſo as they have all a viſible connection with the principal ſubject, which regulates and influences the whole; ſo in muſic there may be various ſubaltern ſubjects, that is, various keys, to which the different parts of the piece may belong: but then, they muſt be all under the influence of the firſt and principal key, and have a ſenſible connection with it.

To give a more diſtinct notion of the key, we muſt obſerve, that the octave contains in it the whole principles of muſic, both with reſpect to conſonance or harmony, and ſucceſſion or melody; and if either ſcale be continued to a double octave, there will, in that caſe, be ſeven different orders of the degrees of an octave, proceeding from the ſeven different letters, with which the terms of the ſcale are marked. Any given ſound, therefore, *i. e.* a ſound of any determinate pitch or tune, may be made the key of the piece, by applying it to the ſeven natural ſounds ariſing from the diviſion of an octave, and repeating the octave above or below, at pleaſure. The given ſound is applied as the principal note or key of the piece, by making frequent cloſes or cadences upon it; and, in the progreſs of the melody, no other but thoſe ſeven natural ſounds can be admitted, while the piece continues in that key, every other ſound being foreign to the fundamental, or key.

For inſtance, ſuppoſe a ſong begun in any ſound, and carried on upwards, or downwards, by degrees and harmonical diſtances, ſo as never to touch any ſounds, but what are referrible to that firſt ſound as a fundamental, *i. e.* are the true ſounds of the natural ſcale proceeding from the fundamental; and let the melody be ſo conducted through thoſe natural ſounds, as to cloſe and terminate in the fundamental, or any of its octaves above or below; that ſound is called the key of the melody, becauſe it governs all the reſt, limiting them ſo far, as that they muſt be to it, in the relation to the ſeven eſſential ſounds of an octave ; and when any other ſound is brought in, it is called *going out of the key*.

From which way of ſpeaking, *viz.* a ſong's continuing in, or going out of the key, it may be obſerved, that the whole octave, with its natural ſounds, come under the idea of a key ; though the fundamental or principal ſound is, in a peculiar ſenſe, called the key.

In which laſt ſenſe of the word key, (*viz.* where it is applied to one fundamental ſound,) another ſound is ſaid to be out of the key, when it has not the relation to that fundamental of any of the natural ſounds belonging to the concinnous diviſion of the octave.

Here too it muſt be added, with reſpect to the two different diviſions of the octave, that a ſound may belong to the ſame key, *i. e.* it may have a juſt muſical relation to the ſame fundamental in one kind of diviſion, and be out of the key with reſpect to another.

Now a piece of muſic may be carried through ſeveral keys ; *i. e.* it may be given in one key, and be led out of that into another, by introducing ſome ſound foreign to the firſt, and ſo on to another : but a regular piece muſt not only return to the firſt key, but thoſe other keys too, muſt have a particular connection with the firſt. It may be added, that thoſe other keys muſt be ſome of the natural ſounds of the principal key, though not any of them at pleaſure.

As to the diſtinctions of keys, we have already obſerved, that to conſtitute any given note or ſound, a key, or fundamental ſound, it muſt have the ſeven eſſential or natural notes added to it ; out of which, or their octaves, all the notes of the piece muſt be taken, while it keeps within the key, *i. e.* within the government of that fundamental. It is evident, therefore, there are but two different ſpecies of keys, which ariſe according as we join the greater or leſs third, theſe being always accompanied with the ſixth or ſeventh of the ſame ſpecies ; the third *g*, for inſtance, with the ſixth or ſeventh *g*, and the third *l* with the ſixth and ſeventh *l*.

This diſtinction is expreſſed under the names of *ſharp* key, which is that with the third *g*, &c. and the *flat* key, which is that with the third *l*, &c. : whence it is plain, that how many different cloſes ſoever there be in a piece, there can be but two keys, if we conſider the eſſential difference of keys ; every key being either flat or ſharp, and every ſharp key being the ſame, as to melody, as well as every flat one.

It muſt be obſerved, however, that in common practice the keys are ſaid to be different, when nothing is conſidered but the different tone, or pitch of the ſound, in which the different cloſes are made. In this ſenſe, the ſame piece is ſaid to be in different keys, according as it is begun in different ſounds, or degrees of tune.

To prevent any confuſion which might ariſe from uſing the ſame word in different ſenſes, Mr. Malcolm propoſes the word *mode* to be ſubſtituted inſtead of the word key, in the former ſenſe ; that is, where it expreſſes the melodious conſtitution of the octave, as it conſiſts of ſeven eſſential and natural ſounds, beſides the fundamental ; and in regard there are two ſpecies of it, he propoſes, that that with a third *g* be called the *greater mode ;* and that with a third *l*, the *leſſer mode :* appropriating the word key to thoſe ſounds of the piece in which the cadence is made ; all of which may be called *different* keys, in reſpect of their different degrees of tune.

To diſtinguiſh then accurately between a *mode* and a key, he gives us this definition ; *viz.* an octave, with all its natural and eſſential degrees, is a mode, with reſpect to the conſtitution, or manner of dividing it ; but with reſpect to its place in the ſcale of muſic, *i. e.* the degree or pitch of tune, it is a key ; though that name is peculiarly applied to the fundamental.

Whence it follows that the ſame mode may be with different keys ; *i. e.* an octave of ſounds may be raiſed in the ſame order, and kind of degrees, which makes the ſame mode, and yet be begun higher or lower ; *i. e.* be taken at different degrees of tune, with reſpect to the whole, which makes different keys ; and *vice verſâ*, that the ſame key may be with different modes, *i. e.* the extremes of two octaves may be in the ſame degree of tune, yet the diviſion of them be different.

Keys alſo imply thoſe little levers in the fore-part of an organ, harpſichord, or piano-forte, by means of which wind is given to the pipes, and the jacks or hammers ſtrike the ſtrings of the inſtrument.

In large organs there are generally three ſets of keys ; one for the great or full organ, one for the choir organ, and one for the ſwell and echoes. The long keys uſed to be black, and the ſhort, or flats and ſharps, white ; but a contrary practice took place about the beginning of the laſt century.

Keys, in *Sea Language*, a name given to certain rocks lying near the ſurface of the water, particularly in the Weſt Indies.

Key, a dry piece of tapering oak, driven into ſcarfs to ſet them cloſe.

Key, in a *Naval Senſe.* See Kay.

Key, in *Polygraphy*, and *Steganography*, denotes the alphabet of a cipher ; which is a ſecret known only to the perſon who writes the letter, and him who deciphers it. See Alphabet and Cipher.

Some ciphers have a ſingle key, where the ſame characters are uſed throughout ; in other ciphers, the characters are varied, and the key is doubled.

Keys, a denomination given to the ſeeds of the aſh.

Key-*Lough*, in *Geography*, a lake of Ireland, in the northern part of the county of Roſcommon, near the town of Boyle. The river Boyle flows through this lake, which is a beautiful piece of water, interſperſed with ſeveral iſlands, ſome of them well wooded, and others highly cultivated. It is ſometimes called Kingſton lough.

KEYNSHAM, a market town and pariſh in the hundred of Keynſham, and county of Somerſet, England, is five miles eaſt of Briſtol, and ſeven weſt of Bath, on the great public road between thoſe cities. In the year 1800, the town conſiſted of 286 houſes, and contained 1591 inhabitants. Here was formerly a conſiderable woollen manufactory, but at preſent the ſtaple trade of the town is malting. An abbey was founded here, in 1170, by William earl of Glouceſter ; and at the diſſolution was granted to Thomas Bridges, ſome of whoſe deſcendants ſtill have an intereſt in the lands annexed to it. The ſub-ſtratum of the county is an immenſe rock ; in which are imbedded vaſt numbers of the cornu-ammonis, or ſnake ſtones. Many of theſe are very large, and by the common people are believed to have originated from ſome miraculous power. The church is a large building. Here are a weekly market, and two annual fairs. Collinſon's Hiſtory, &c. of Somerſetſhire, 3 vols. 4to.

KEYSLER, John George, in *Biography*, a celebrated traveller, was born at Thurnau, in the county of Giech, in the year 1683. He received a good education, and manifeſted, at an early period, a ſtrong attachment to the ſciences. At a proper time, and having laid in a good ſtock of elementary knowledge, he was entered at the univerſity of Halle, where he ſtudied juriſprudence, without neglecting the

the other branches of academical inſtruction. When he had finiſhed his ſtudies, he was invited to ſuperintend the education of Charles Maximilian, and Chriſtian Charles, counts of Giech-Buchau, with whom he repaired to Halle in 1717, and then accompanied them on their travels in foreign countries. In his journey he met with the celebrated Roland, who recommended to his attention the immenſe field of German antiquities, as yet almoſt untouched: he accordingly caught at the idea, and formed the reſolution of undertaking ſomething ſyſtematic on the antiquities of Germany, and the origin of its inhabitants. He went through the principal towns in Germany and the Low Countries, collecting, as they occurred, materials for his intended work. In conſequence of the great reputation which he acquired in his firſt tour, M. Bernſtorff, miniſter of his Britannic majeſty in Hanover, an enlightened ſtateſman, engaged him as a travelling tutor to his ſons. After remaining two years in Hanover, he obtained permiſſion, in 1718, to viſit England for his own improvement. At London and Oxford he met with a kind reception, but nothing, probably, pleaſed him more, than the honour of being elected a member of the Royal Society. He wrote ſome tracts at this period, one containing ſeveral curious obſervations on Stonehenge, and a diſſertation on the conſecrated miſletoe of the Druids; and on his return to Hanover in 1720, he publiſhed his immortal work, entitled "Antiquitates ſelectæ Septentrionales et Celticæ," in which the author is exceedingly happy in ſolving a great number of difficulties never before ſufficiently explained. In 1727, Keyſler's pupils, who continued under his care more than ten years, accompanied him to Tubingen, and, in 1729, they began their travels, which compriſed the whole of Germany, Swiſſerland, Italy, Hungary, France, England, and Holland. On their return ample proviſion was made for the tutor, and they entruſted him, at the ſame time, with a valuable library, their collection of medals and natural curioſities, and even gave him the chief management of their domeſtic concerns. M. Keyſler, in the courſe of his travels, had made a valuable collection of books, antiques, &c., to which he added, by purchaſe, that of M. Eckard, and to prevent the whole from being diſperſed, he deſtined it after his death to be added to that of M. Bernſtorff. He was of an open and communicative diſpoſition, and ready to aſſiſt in their literary labours, all thoſe who ſtood in need of his advice. He rendered M. Eckard great ſervice when about to publiſh his German Antiquities, after the model of the "Theſaurus Antiquitatum Græcarum et Romanarum," by Grævius and Gronovius. This work was never printed. In 1728, when M. Jark reprinted the work of Schedius, on the German deities, Keyſler not only corrected it, but furniſhed him with conſiderable additions, and ſubjoined an ingenious diſſertation "De cultu Solis." He died ſuddenly, in June 1743, at Stentenbourg, an eſtate belonging to M. Bernſtorff. His travels were tranſlated into the Engliſh language from the ſecond edition in German, and publiſhed in four vols. 4to. Gen. Biog.

KEYSERSTUL, in *Geography*, a town of Switzerland, in the county of Baden, on the river Rhine, with a wooden bridge to Schaffhauſen; 9 miles N.N.E. of Baden. N. lat. 47° 37′. E. long. 8° 15′.

KEY-SIMA, an iſland of Japan, between Corea and the W. coaſt of Niphon.

KEY-WALE'LA, an iſland in the Eaſt Indian ſea, about 45 miles in circumference. S. lat. 5° 36′. E. long. 138°.

KEYWAWA, a ſmall iſland near Charleſton harbour, South Carolina.

KEYZER'S BAY, a bay on the S. coaſt of the iſland of Sumatra. N. lat. 5° 40′. E. long. 104° 38′.

KEZEMSKA, a town of Ruſſia, in the government of Irkutſk, on the Angara; 40 miles S.W. of Ilimſk.

KEZEREH, a town of Natolia; 40 miles E. of Caſtamena.

KEZIL, a river of Perſia, which runs into the Caſpian ſea, near Reſhd.

KEZIL, *Kheſil*, or *Khezil*, a river of Aſia, which riſes in the mountains of Bucharia, N.E. of Samarcand, and formerly ran into the Caſpian ſea; but the Ruſſians, in 1719, endeavouring to trace the ſtream, were put to death by the Tartars, who turned the current of the river into lake Aral, by uniting it with the Gihon: but this change of the courſe of the Gihon has been diſputed. See OXUS. See alſo KHARASM.

KEZIL-*Agaſh*, a town of Perſia, in the province of Ghilan; 20 miles N. of Lenkeran.

KEZIL-*Kaja*, a town of Natolia; 25 miles S. of Iſbarteh.

KEZIN, a town of Poland, in Volhynia; 10 miles W. of Krzeminiec.

KEZMA, a town of Ruſſia, in the government of Irkutſk, on the Tunguſka; 160 miles N.N.W. of Ilimſk.

KEZUC, a town of Perſian Armenia; 4 miles S. of Erivan.

KHABUR, a river of Aſiatic Turkey, which riſes 20 miles E. of Harran, and runs into the Euphrates at Kerkiſia.—Alſo, a river of Curdiſtan, which paſſes by Beths and runs into the Tigris; 15 miles S.E. of Gezira.

KHADARAH, EL, or CHADRA, a town of Algiers, in the province of Tremecen, ſeated on an eminence near the river Shelliff. Dr. Shaw concludes from its ruins, which are about three miles in circumference, that it was once a large place. According to Ptolemy, its ancient name was "Zucchabbari," and according to Pliny "Succabar" and "Colonia Auguſta." Eaſtward are the remains of a ſtone bridge, probably the only one ever built over the Shelliff, though travellers are much inconvenienced, in the winter ſeaſon, by waiting a whole month before they can ford it; 55 miles S.S.W. of Algiers.

KHALEKAN, EBN, in *Biography*, a celebrated biographer of illuſtrious Muſſulmen, particularly of ſuch as were diſtinguiſhed by their proficiency in the ſciences, was born in the year 608, and died in 681 of the Hegira. His work is entitled "Vafiat Alaian," or "The Deaths of illuſtrious Men," and was undertaken by him at the city of Cairo, in Egypt, under the reign of Bibars, a ſultan of the Mameluke dynaſty. Being appointed by that prince cadi of Damaſcus in the year 659, the duties of his new employment ſo far interrupted his ſtudies, that he was not able to finiſh his work before the year 672.

KHAMI, in *Geography*. See HAMI.

KHAMIES BERG, a cluſter of mountains belonging to the colony of the Cape of Good Hope, ſituated in the middle of the country, that was formerly inhabited by the Namaaqua Hottentots, at the diſtance of five days' journey N.W. from the *Hantam*, (which ſee,) over a dry ſandy deſert almoſt deſtitute of water. This cluſter of mountains being the beſt, and indeed almoſt the only habitable part in the Namaaqua country, has been taken poſſeſſion of by the wandering peaſantry, who, to the advantage of a good grazing country, had the additional inducement of ſettling there, from the eaſy means of increaſing their ſtock of ſheep from the herds of the native Hottentots, who, however, are now ſo reduced and ſcattered among the Dutch farms, as ſcarcely to be conſidered a diſtinct tribe of people. The copper mountains commence where the Khamies-berg ends, the whole ſurface of which is ſaid to be covered with malachite, or the carbonate of copper, and cupreous pyrites. But the ores of theſe mountains, though abundant and rich, are of no great value on account of the total want of every kind of fuel to ſmelt them, as well as of their very great diſtance from the Cape, and from there being neither bay nor river, where they could be put on board of coaſting veſſels. In the Khamies-berg is alſo found, in large blocks, that beautiful ſpecies of ſtone, to which mineralogiſts have given the name of Prehnite.

KHAMIR. See Chamir.

KHAN, or Kan, the name of an officer in Perſia, anſwering to that of *governor* in Europe. There are khans of provinces, countries, and cities, who have different additions to diſtinguiſh them. In the language of the north of Aſia, this title expreſſes the full extent of the regal dignity.

KHANAKA, a town of Kharaſm, on the Gihon; 250 miles S.W. of Samarcand.

KHANGA, El, a town of Egypt, formerly enriched by the caravans which paſſed from Cairo to Syria, and containing about 1000 inhabitants; 12 miles N.E. of Cairo.

KHANUDUM, a large lake of Perſia, in the province of Adirbeitzan, 60 miles long and 30 broad; called alſo the lake of Urmia; 30 miles S.W. of Tabris.

KHARA, a malignant being, according to Indian legends, who commanded a legion of 14,000 demons, like himſelf, in the wars of Lanka, as Homerically deſcribed in the Rama-yana. He eſpouſed the cauſe of Ravena, and was with his followers deſtroyed by Rama.

KHARASM, Charasm, or *Kharizm*, in *Geography*, a country of Aſia, bordered on the N. by Turkeſtan, on the E. by Great Bucharia, on the S. by Choraſan, or Koraſan, and on the W. by the Caſpian ſea; extending from the Gihon, or Amu to this ſea, and terminating N. and S. in wide deſerts. Its chief town is Khiva. This country is about 350 miles in length and breadth, and in the time of Zingis, was a powerful kingdom, including at that time Koraſan, and a part of Great Bucharia. D'Anville ſuppoſes, that this country was the Choraſmia of antiquity, and he ſuppoſes Koraſan to have been the ſeat of the Parthians. In the 10th century, Ebn Haukal calls this country Khuarezm, and ſays that the river Gihon flows into the lake of Khuarezm, while he terms the Caſpian the ſea of Khozr. We have reaſon to believe, that the deſerts, probably occaſioned by the decompoſition of hills of ſand-ſtone, have increaſed in Kharaſm; and theſe encroachments may be eſtimated from the hiſtorians of Zingis and Timur. At preſent this ſtate is almoſt reſtricted to the diſtrict of *Khiva* (which ſee), the circuit of which may be performed on horſeback in three days; but there are five walled cities or rather towns within half a day's journey of each other. The inhabitants are Turcomans and Uſbeks, beſides the Sarts, which perhaps is another name for the Tadjiks. The khan is abſolute and altogether independent of any other power, except the Mulla Baſhi, or high prieſt, by whom he is controlled. The Kievinſki Tartars differ very little from the Kirgeeſe or *Kirghiſes* (which ſee), but ſurpaſs them in cunning and treachery. Their manners are the ſame, only that the Kirgeeſe live in tents, whilſt the others inhabit cities and villages. Their only trade is with Bokhara and Perſia, whither they carry cattle, furs, and hides, all which they have from the Kirgeeſe and Turcoman Tartars, who are often very troubleſome neighbours to them. The place itſelf produces little more than cotton, lamb-furs of a very mean quality, and a ſmall quantity of raw ſilk, ſome of which they manufacture. Hanway, cited by Pinkerton. (See Khiva.) The hiſtory of Kharaſm has been well illuſtrated by its king, or khan, Abulghazi, in his general hiſtory of the Tartars, written about the year 1660. See his biographical article.

KHAREJITES, the firſt heretical ſect among the Mahometans, which revolted from Ali in the 37th year of the Hegira; and hence their name, which ſignifies "revolters," or "rebels." This ſect commenced with 12,000 men, who abandoned Ali and his cauſe, after having fought under him at the battle of Seffein, taking offence at his ſubmitting the deciſion of his right to the caliphate, which Moawiyah diſputed with him, to arbitration, though they themſelves had firſt obliged him to do it. They were alſo called Mohakkemites, or Judiciarians; becauſe the reaſon which they gave for their revolt was, that Ali had referred a matter concerning the religion of God to the judgment of men, whereas the judgment, in ſuch caſe, belonged only to God. The hereſy of the Khârejites conſiſted in two particulars; *viz.* 1. That they affirmed a man might be promoted to the dignity of Imam, or prince, though he was not of the tribe of Koreiſh, nor even a freeman, provided he was a juſt and pious perſon, and endowed with the other requiſite qualifications, and alſo held, that the Imam, if he turned aſide from the truth, might be depoſed or put to death, and that there was no abſolute neceſſity for any Imam at all in the world. 2. That they charged Ali with ſin, for having left an affair to the judgment of men, which ought to have been determined by God alone; and went ſo far as to declare him guilty of infidelity, and to curſe him, on that account. In the following year, *viz.* the 38th of the Hegira, all the Khârejites, who perſiſted in their rebellion, to the number of 4000, were cut to pieces by Ali. Nine of them are ſaid to have eſcaped, two into Oman, two into Kerman, two into Segeſtan, two into Meſopotamia, and one to Tel Mawrûn; and to have propagated their hereſy in thoſe places, the ſame remaining there to this day. The principal ſects of the Khârejites, beſides the Mohakkemites already mentioned, are ſix; which, differing in other reſpects, agree in abſolutely rejecting Othman and Ali, preferring the doing of this to the greateſt obedience, and allowing marriages to be imparted on no other terms; that they account thoſe who are guilty of grievous ſins to be infidels; and that they hold it neceſſary to reſiſt the Imam when he tranſgreſſes the law. Sale's Koran, Introd.

KHATANGA, in *Geography*, a river of Ruſſia, that has its ſource in a lake in the government of Tobolſk, about 68° N. lat. and 110° long.; and in 120° long. ruſhes into a large bay of the Frozen ocean, called Khatanſkaia Guba. This river purſues the greateſt part of its courſe through a low and very marſhy country; and the moſt conſiderable rivers which add to its waters are the Kheta and the Potigan.

KHATOUN-SERAI, a town of Aſiatic Turkey, in Caramania; 12 miles S. of Cogni.

KHAUAR, or Chever, a town of Perſia, in the province of Irak, ſeated on a mountain, which terminates the province of Irak towards Mazanderan, and gives name to a paſs, called the Strait of Khauar; 200 miles N. of Iſpahan.

KHAUASH, a town of Perſia, in Segeſtan; 18 miles N. of Zareng.

KHAULAN, a ſmall diſtrict of Arabia, in the province of Yemen; a few leagues S.E. of Sana. It is governed by an independent ſcheick, the repreſentative of a very ancient family; who ordinarily reſides at Beit Rodsje, a ſmall town in his own dominions. Several places which once belonged to the prince of Khaulan have been gradually annexed to the dominions of the Imam.—Alſo, a ſmall diſtrict of Arabia, lying among the mountains weſtward from Saade, upon the road from Sana to Mecca, four days journey from Hali, the extreme city upon that ſide of the ſherriff's territory. It has an independent ſcheick.

KHAZARES, the name of a bold and powerful Turkiſh tribe, which firſt occupied the iſthmus of Caucaſus between the Caſpian and the ſea of Azof. In the ſeventh century they began to be famous, and till towards the middle of the ninth century their ſtate was increaſing and flouriſhing. About that time the empire of the Khazares extended from the Volga and the Caſpian, acroſs the Caucaſian iſthmus, the peninſula of the Krimea, and what is now the ſouth of Ruſſia, as far as to Moldavia and Walachia; and ſeveral Slavonian tribes, particularly the Polianes about Kief and on the Dnieper, the Severans, on the rivers Deſna, Sem, and Sula, the Viatitſches on the Oka, and the Radimitſches on the Soſha, were tributary to them. But after the year 862, three nations effected their downfal; *viz.* the Ruſſians, the Petſchenegrans, and the Uzes. The Varagian or Ruſſian leaders, Oſkold and Dir, raviſhed from them the dominion over the Polianes; Oleg, in 884, reduced the Severans and the Radimitſches to his authority. His ſucceſſor, in 964, conquered the territory of the Viatitſches and the nine Khazarian countries on the iſthmus of Caucaſus. The Khazares loſt the reſidue of their dominion about 1016, to the combined forces of the Ruſſians and Romans of the eaſt. The nation, indeed, continued for ſome time longer, but they were ſubmiſſive and tributary to the Ruſſians. Tooke's Ruſſ. Emp. vol. i.

KHAZINE, the grand ſeignior's treaſury. See Treasury, and Exchequer.

Here are kept regiſters of receipts, accounts of provinces, in drawers, marked with the years, and the places' names: here is alſo kept part of the emperor's wardrobe.

Every day of the divan this treaſury is opened, either to take out, or put ſomething in; and the principal officers, who have the charge of it, are all to aſſiſt at this opening. The tchaouch-bachi, in their preſence, firſt breaks the wax with which the key-hole had been ſealed up, and carrying it to the grand vizir, that miniſter firſt kiſſes it, and then draws out of his boſom the grand ſeignior's gold ſeal. In the mean time he looks narrowly after the officer, who, when he has done his buſineſs in the treaſury, locks and ſeals up the place, and returns the ſeal to the vizir with the ſame ceremony as before.

Beſides this, there are other apartments for the money, where the officers are never allowed to enter with any clothes that have pockets in them.

KHEIR, in *Geography*, a town of Hindooſtan, in the country of Viſiapour; 18 miles N. of Poonah.

KHEIVAN, a town of Arabia, in a diſtrict of the ſame name, in the extenſive country of Haſchid-u-Bekil, is remarkable for having been the ſeat, firſt of the Hamjare monarchs, and afterwards of the Imams. Ruins of a very ancient palace are ſtill to be ſeen there.

KHEMLASA, a large walled town of Hindooſtan, adjoining to which is a fort, built upon a hill. It belongs to the diſtrict of Sagur, which is diſtant about 17 coſs to the ſouth eaſtward.

KHIEBAR, or Keibar. See Hedjas.

KHIEVA, or Khiva, a diſtrict of Kharasm, which ſee.—Alſo, the capital of this diſtrict and of Kharaſm, ſituated on a riſing ground, W. of the river Gihon, and having three gates, and a very thick, ſtrong wall of earth, much higher than the houſes, with turrets at ſmall diſtances, and a broad deep ditch full of water. It occupies a conſiderable ſpace, and commands a pleaſant proſpect of the adjacent plains, which the induſtry of the natives has rendered very fertile; but the houſes are low, moſtly built with mud, the roofs flat, and covered with earth. The city of Urghenz, which was formerly the capital of Kharaſm, is now in ruins, with only a moſque remaining. The moſt ſouthern town in the dominions of Khiva is Azariſt, or Hazaraſp, which adjoins to the great deſart, called *Karakum*, which ſee. Khiva is ſaid to ſtand at the diſtance of 17 days from the Caſpian ſea, and from Orenburg 33, computing the day's journey at 40 verſts; equal, by Hanway's account, to 17 Britiſh miles; ſo that the diſtance of Khiva from the Caſpian would be 459 Britiſh miles, while our maps ſcarcely allow 300. In 1739, the khan of Khiva aſſembled an army of 20,000 men, to oppoſe Nadir; but the city ſurrendered at diſcretion. According to the information of Pallas, the people of Khiva bring to Orenburg conſiderable quantities of raw cotton. But the coaſts of the Caſpian are held by ſome remains of Turcomans in the north, and by Uſbeks in the ſouth. A more conſiderable trade is maintained with *Manguſhlak*, which ſee. As the merchants of Khiva brought gold and gems to Aſtrachan, probably from the two Bucharias, an idea was ſuggeſted to Peter the Great, that theſe precious products were found in Kharaſm, in conſequence of which he attempted a ſettlement. But the Ruſſians, to the number of 3000, advancing under the command of a Circaſſian prince, called Beckawitz, towards Khiva, were all cut off by the Uſbeks. Upon this occaſion, as it has been ſaid, theſe Tartars changed the courſe of the Kheſel or Kezil, which formerly fell into the Caſpian; but as this river is on the E. of the Gihon, it is clear that it could not paſs that river to join the Caſpian; and in the 10th century the Gihon is known to have flowed into the Aral. It is not improbable that, before the deſerts encroached on Kharaſm, one or two rivers might have run to the Caſpian from the eaſt; or perhaps theſe fables may have ariſen from one or two ſmall branches of the Amu having joined that ſea. Pinkerton. Khiva is 260 miles N.W. of Samarcand. N. lat. 41° 30′. E. long. 58° 25′.

KHILLI, a cape on the N.E. coaſt of the iſland of Negropont. N. lat. 38° 36′. E. long. 24° 4′.

KHILLIS, a town of Syria, governed by an Aga; which, ſome years ago, was created into a pachalic, to reſtrain the Arabs; but the pacha being defeated, it was again put under an Aga. It is ſituated at the foot of Mount Taurus, and is a celebrated market for cotton; 28 miles N.N.W. of Aleppo.

KHIRTIPOOR, a town of Nepaul, the reduction of which coſt the conqueror ſo much trouble, that in reſentment of the reſiſtance made by the inhabitants, he cut off all the men's noſes. Col. Kirkpatrick, at the diſtance of 23 years, was reminded of this act of barbarity, by obſerving that a great proportion of the people appointed to tranſport his baggage acroſs the hills were deprived of their noſes. To perpetuate this exploit, the ſovereign ordered the name of the place to be changed to Naſkatapoor, which ſignifies "the town of men without noſes."

KHONDEMIR, in *Biography*, a celebrated Perſian hiſtorian, who obtained the patronage of the emir Ali Shir, a lover and protector of men of letters, whom he inſpired with a paſſion for his own favourite purſuit, and with the deſire of forming a collection of the principal writers in this claſs of ſcience. The great object which Khondemir had in view, was to facilitate the ſtudy of hiſtory by drawing it up in a more methodical manner, than had been done by other writers, and the reſult of his labours was a judicious compendium of oriental hiſtory from the creation of the world to the year 875 of the Hegira, under the title of "Khelaſſat Alakhar fi Veian Ahual Alakhiar," that is, "A faithful and correct Summary of what is valuable and intereſting in the moſt authentic and genuine Hiſtories."

KHORASAN, Korasan, *Choraſan*, or *Coraſan*, in *Geography*, a province of Perſia, ſituated in the N.E., and bounded on the N. by Kharaſm, on the E. by Bucharia and Candahar, on the N.E. by the river Gihon or Oxus, on the S. by the lake of Zurrah, or Durrah, and Segeſtan, and on the W. by the province of Mazanderan and the Caſpian ſea. This province comprehends the ancient countries of Margiana N. and Ariana S. Its length is eſtimated at 450 miles, and its breadth at 420. This country was comprehended within the dominions of Timur Bec, who conquered it in 1396, and granted it to his ſon Mirza Charoc, together with Mazanderan and Segeſtan. Its capital is Herat.

KHORFAKAN, a ſea-port of Arabia, in the province of Oman, ſituated in the bottom of a bay of the Arabian gulf, which is only open to the eaſt. On the S.E. ſide is a harbour for boats. The town is now in a reduced ſtate, conſiſting moſtly of fiſhermen's huts, with few houſes of ſtone. N. lat. 25° 15′. E. long. 56° 14′.

KHORREMABAD, or Curremabad, a town of Perſia, in the province of Irak, ſituated on a river which runs into the Karaſu; 200 miles W.N.W. of Iſpahan. N. lat. 34° 35′. E. long. 48° 5′.

KHOSCIAH, a town of Arabia, in the province of Hedsjas; 26 miles S.W. of Medina.

KHOUD, a town of Hindooſtan, in Oriſſa; 35 miles S. of Koonjoor.

KHUNTIJANT, a town of Hindooſtan, in Guzerat; 20 miles N. of Surat.

KIA, a town on the E. coaſt of the iſland of Gilolo.

KIAB, a town of Perſia, in the province of Chuſiſtan, on the Karaſu; 120 miles N. of Baſſora. N. lat. 32° 30′. E. long. 47° 40′.—Alſo, an Arabian tribe, called alſo by the Perſians "Tsjeb," who inhabit the furtheſt point upon the ſide of the Perſian gulf. The territory of this tribe extends from the deſert of Arabia to the country of the Hindian, and northward to the principality of Haviſa. It is watered by ſeveral rivers, large and ſmall. It abounds in dates, rice, grain, and paſture. Its principal cities are Dameh, lying within Perſia, Hafar, and Ghoban, the ſeat of a ſcheick, near one of the mouths of the Euphrates.

KIA-KING, a city of the firſt rank in China, in the province of Tche-kiang. This city is large and populous, and carries on a good trade; its ſuburbs are extenſive, and over the canals and ditches are ſeveral bridges, and there is not a houſe in the town, in which ſilk-worms are not bred. Canals are cut through all parts of the town; and its ſtreets are ornamented with beautiful piazzas, which ſhelter paſſengers from the ſun and rain. There are many triumphal arches within and without the city, and 15 marble towers on the ſides of the canal that lies to the weſt of the city, by which all the barks paſs. Seven cities of the third claſs are dependant upon it. N. lat. 30° 50′. E. long. 120° 14′.

KIAKILUMA, one of the ſmall Japaneſe iſlands. N. lat. 29° 50′. E. long. 132° 12′.

KIAKTA, or Kiachta, a town of Ruſſia, in the government of Irkutſk, ſituated on a ſmall river which runs into the Selinga: one of the places open, between the courts of Peking and Peterſburg, to private trade between the ſubjects of both nations; the other is Tzuruchatu, or Zuruchaitu, on the Argunia; according to a treaty, ſettled at Kiakta, in 1728. In 1762, the empreſs aboliſhed the imperial monopoly, and laid the fur trade open; ſince which time, no caravans have been ſent to Peking, and Kiakta is become the centre of the Ruſſian and Chineſe commerce; 60 miles S. of Selengiaſk. (Coxe's Ruſſian Diſcoveries, p. 220.) Kiakta contains about 150 houſes, inhabited ſolely by merchants and commiſſaries. Oppoſite to it, about 120 yards diſtant, lies the Chineſe village of Maimatſchin, containing about 200 houſes. Kiakta is reckoned the third trading city in Ruſſia, and ſtands 498 verſts S. of Irkutſk, and 1532 from Peking, on a ſmall ſtream of the ſame name. The following goods are exported free of duty; *viz.* all ſorts of paper, Ruſſian cloth (except the common cloth uſed by peaſants), and ſpirits diſtilled from fruits. Goods imported, which are duty free, are raw and dyed wools, glaſs-coral, falſe pearls, white lead, fans, ſewing needles, printed cottons, ginger, confectionary, rice, toys, muſical and other inſtruments, porcelain, earthen ware, lacquered and enamelled goods, furniture, and ornamental articles. The exportation of arms, warlike ſtores, powder and lead, ſpecie, gold and ſilver in ingots, ſtallions and mares, hides, beaver-hair, pot-aſh, reſin, and hemp-yarn, is prohibited; as is alſo the importation of ſalt, ſpirits, poiſons, and copper coin. Since the year 1754, the merchants of European Ruſſia, who traded with Kiakta, were allowed, on account of the diſtance, to pay the duties there by giving drafts. An order in 1794, extended this privilege to the Siberian merchants likewiſe, under the following conditions; the drafts muſt be given on Irkutſk, Tobolſk, Moſcow, or Peterſburgh, and made payable there. Nine months' payment was allowed, but 10 *per cent. per annum* were claimed by the crown for this allowance. The drafts muſt be drawn according to a particular form, and guaranteed. The moſt important articles of trade are peltry, partly imported to Peterſburgh from North America, particularly Canada, Ruſſian manufactures, *viz.* hides, leather, coarſe cloth, Ruſſia leather, Muſcovian woollens and ſilks, linen, metal and glaſs wares, and iſinglaſs; proviſions, *viz.* ſheep and cattle, ſalt meat, &c. and tallow and glue, foreign manufactures, particularly fine cloths. The principal articles imported, are fine ſilver in ſtamped bars; raw and wrought ſilk; raw and manufactured wool; tea; rhubarb, porcelain, tobacco, proviſions and preſerved fruits. The manner of conducting the commerce of Kiakta is as follows. Barter is the grand medium. The Chineſe come to the Ruſſian warehouſes, where the ſamples are laid out, previouſly to make their aſſortments. Bargains are often ſtruck on the ſpot, but generally the Chineſe go to the merchants' houſes to ſettle their buſineſs. At firſt the Ruſſians ſtate what Chineſe goods they will take in exchange; then the price is accurately fixed by both parties; and when they are agreed, they return to the warehouſe, where the Chineſe puts his ſeal on the bales, and ſometimes on the whole ſtock. Then the Ruſſian goes to the Chineſe, examines the goods which he is to receive in exchange, and if they anſwer the contract the barter is concluded. For the conveyance of this merchandize the Chineſe moſtly uſe camels, but ſometimes two-wheeled carts. When the caravans croſs the deſert in winter, they carry with them tents made of felt; but in ſummer they have balagans, made of reeds, which fold up and are put into a caſe. When the balagans are fixed, and covered with ſail-cloth, two perſons can ſleep in one of them very commodiouſly. All the Chineſe who trade to Kiakta underſtand the Mogul language, which is alſo ſpoken by the Ruſſian merchants.

The ſtate of the trade at Kiakta, from 1793 to 1797, was as follows :

Imports	- -	2,546,825 rubles
Exports	- -	2,543,785
Total	-	5,090,610

Zuruchaitu, another mart of the Ruſſian and Chineſe trade, though much inferior to Kiakta, is ſeated on the river Argun, and lies 1326 verſts eaſt of Irkutſk. When the Mogul troops are quartered on the frontiers during the ſummer, this place carries on a trifling bartering trade in articles of primary neceſſity, which are not worth the detail, as the trade is ſunk almoſt to nothing. From 1793, to 1797, the imports and exports amounted only to 724 rubles ; whereas from 1773, to 1777, they amounted to 2985 rubles.

KIALEK, a town of Perſia, in Adirbeitzan ; 50 miles N.W. of Urmia.

KIAM, a town of Egypt, on the right bank of the Nile ; 20 miles S. of Girgé.

KIANGARI, a town of Natolia, and chief place of a ſangiacate, defended by a caſtle on a rock; 256 miles E.S.E. of Conſtantinople. N. lat. 39° 54'. E. long. 34° 17'.

KIANG-NAN, a province of China, reckoned to be the moſt fertile, commercial, and opulent in the whole empire. It is bounded on the W. by the provinces of Honan and Hou-quang ; on the S. by Tche-kiang and Kiang-ſi ; on the E. by the gulf of Nan-king ; the reſt borders on the province of Chan-tong. The emperors long kept their courts in this province ; but they have ſince made choice of Peking, becauſe it is nearer to Tartary. This province is of vaſt extent, and contains 14 cities of the firſt claſs, and 93 of the ſecond and third. Theſe cities are very populous, and places of trade. Large barks can go to them from all places, becauſe the whole country is interſected by lakes, rivers, and canals, which have a communication with the great river Yang-tſe-kiang, or Kian-kou, which runs through the middle of the province. Silk ſtuffs, lacquer-ware, ink, paper, and, in general, every thing that comes from Nanking, as well as from the other cities of the province, are much more eſteemed, and fetch a higher price, than thoſe brought from the neighbouring provinces. In the village of Chang-hai alone, and the villages dependent upon it, there are reckoned to be more than 200,000 weavers, of common cotton cloths. The manufacture of theſe affords employment to the greater number of the women. In ſeveral places on the ſea-coaſt there are found many ſalt pits, from which ſalt is diſtributed over the whole empire. Upon the whole, this province is ſo abundant and ſo opulent, that it brings every year into the king's treaſury about 32,000,000 taels, a tael being equal to an ounce of ſilver, worth, in China, about ſix ſhillings ſterling ; excluſive of the duties upon exports and imports. The inhabitants, who, according to the eſtimate of ſir George Staunton, amount to 32 millions, are ingenious and docile ; and hence many of them become eminent in literature, and riſe by their abilities to offices of importance. This province is divided into two parts, each of which has a diſtinct governor. The governor of the eaſtern part reſides at Sou-tcheou, that of the weſtern at Nan-king, which is the capital of the province. Groſier.

KIANG-NING. See NAN-KING.

KIAN-FE, or TCHIANG-FE, a town of Thibet, near a river which runs into the Sanpoo. It is repreſented as a fine city with a fortreſs, and a convent, ſo extenſive, as to have the appearance of another city ; 25 miles S.W. of Laſſa. N. lat. 29° 58'. E. long. 90° 4'.

KIAN-KU, KIAM, *Kiang*, or *Yang-tſe-kiang*, one of the two great rivers of China, (the other being *Hoan-ho*, or *Hoang*, which ſee,) riſes in the vicinity of the ſources of the Hoan-ho ; but according to the received accounts and maps about 200 miles further to the weſt, and winds nearly as far to the ſouth as the Hoan-ho does to the north. After waſhing the walls of Nan-king, it enters the ſea about 100 miles to the ſouth of the Hoan-ho. The Kian-ku is known by various names through its long progreſs ; and near its ſource is called by the Eluts Porticho or Petchou : the courſe is about equal to that of the former, theſe two rivers being conſidered as the longeſt on the face of the globe : they certainly equal, if they do not exceed, the famous river of the Amazons in South America, and the majeſtic courſe of the Ganges does not extend half the length. In the late embaſſy of lord Macartney, the length of the Kian-ku is eſtimated at about 2200 miles ; and it is obſerved, that theſe two Chineſe rivers, taking their ſources from the ſame mountains, and paſſing almoſt cloſe to each other, in a particular ſpot, afterwards ſeparate from each other to the diſtance of 15° of latitude, or about 1050 Britiſh miles ; and finally diſcharge themſelves into the ſame ſea, comprehending a tract of land of about 1000 miles in length, which they greatly contribute to fertilize. To theſe great rivers many important ſtreams are tributary. Pinkerton.

KIANG-SI, a province of China, bounded on the N. by that of Kiang-nan, on the W. by Hou-quang, on the S. by Quang-tong, and on the E. by Fo-kien and Tche-kiang. The country is very fertile, but it is ſo populous, that it can ſcarcely ſupply the wants of its inhabitants. The mountains of this province are covered with medicinal plants and trees, and contain in their bowels mines of gold, ſilver, lead, iron, and tin. The rice of this country is delicate, and ſeveral barks are loaded with it every year for the court. The porcelain, made principally at King-te-ching in this province, is the fineſt and moſt valuable of the empire ; and the wine made from this rice is reckoned delicious by the Chineſe. The river Kan-kiang divides the whole province into two parts ; and it contains 13 cities of the firſt claſs, and 78 of the ſecond and third. The capital is Nan-tchang. The population of the province, according to ſir George Staunton's ſtatement, is 19,000,000.

KIAO-KE, a town of Corea ; 72 miles W. of King-ki-tao.

KIAO-TAO, a ſmall iſland of China, in the Hoan-ho, or Yellow river, near the coaſt of Corea. N. lat. 38° 13'. E. long. 124° 25'.

KIARE, a town of Perſia, in the province of Irak ; 30 miles S.W. of Caſbin.

KIA-TCHUEN, a town of Corea ; 27 miles S.S.W. of Sing-tcheou.

KIA-TING, a city of China, of the ſecond claſs, in the province of Se-tchuen, on the river Yang : great quantity of muſk is collected in the environs of this city. N. lat. 29° 29'. E. long. 103° 30'.

KIAUTEN, a town of Pruſſian Lithuania, ſituated in a mountainous country, with an iron foundery, and a large manufacture of paper.

KIAYA-BEY, an officer in the Ottoman empire, who is the lieutenant of the viſir, and momentarily diſcharges his functions when the latter happens to die. All affairs paſs through his hands before they arrive at the viſir, and all orders emanating from the Porte receive their execution through the impulſe of the kiaya-bey. He is appointed by the grand ſignior, on the preſentation of the viſir. He is generally involved in the diſgrace of his principal, and if he do not loſe his head as frequently as the other, his fortune always, in that caſe, runs the greateſt riſk. Although he has no military rank, it may be ſaid that he occupies the ſecond adminiſtrative place in the empire, conſidering the importance and multiplicity of his functions. If the ſultan be diſſatisfied with his ſervices, he receives, on quitting his office, the dignity of ſimple viſir, or pacha with three tails. It ſeldom happens that he is given only the two tails when he is ſent to govern a province. See Bey.

KIBBIED, in *Geography*, a town of Africa, in Bornou; 150 miles S.E. of Bornou. N. lat. 18° 23′. E. long. 24° 16′.

KIBES. See Chilblain.

KIBITKA, a travelling carriage in Ruſſia, which is a ſmall cart capable of containing two perſons abreaſt, while the driver ſits on the farther extremity cloſe to the horſes' tails. It is about five feet in length, and the hinder half is covered with a ſemi-circular tilt, open in front like the top of a cradle, made of laths, interwoven and covered with birch or beech-bark. There is not a piece of iron in the whole machine. It has no ſprings, and is faſtened by means of wooden pins, ropes, and ſticks to the body of the carriage. The Ruſſians, when they travel in theſe kibitkas, place a feather-bed in the bottom, admirably calculated to break the intolerable jolts and concuſſions occaſioned by the uneven timber roads. With this precaution, a kibitka, though inferior in ſplendour, equals in comfort the moſt commodious vehicle. The traveller ſtretches himſelf at length upon the feather-bed; and, if inclined, may doſe away the journey in perfect tranquillity.

KIBOLA, in *Geography*, a town of Mingrelia; 25 miles S.E. of Anarghia.

KICKAPOO, a town of America, in the Weſtern territory. N. lat. 40° 20′. W. long. 87° 10′.

KICKAPOUS, an Indian nation, whoſe different tribes inhabit near the entrance of lake Superior, where, ſome years ago, they had 400 warriors; ſome reſide at lake Michigan, and between that and the Miſſiſippi, near the Outtagomies, &c.; and another tribe near the Piankeſhaws, and on the Wabaſh and its branches. The Kickapous and Kaſkaſkias, two Indian nations lately hoſtile, ceded lands to the United States at the treaty of Greenville, Aug. 3, 1795. See Kaskaskias.

KICKEMNIT, a river of America, being the north-weſtern arm of Mount Hope bay; about two miles long, and half a mile broad. North-weſt of it lies the town of Warren, in the ſtate of Rhode iſland.

KICKER, in *Agriculture,* a term applied to ſuch horſes as have the habit of kicking: this ſhould be particularly guarded againſt in the rearing and managing of young horſes, eſpecially thoſe intended for team labour.

Kicker *againſt the Spurs*, in the *Manege*. See Ramingue.

KICKTOOL, in *Geography*, a town of Eaſt Greenland. N. lat. 61° 15′. W. long. 45° 5′.

KICYDANI, a town of Lithuania, in the palatinate of Wilna; 48 miles N.N.W. of Troki.

KID, a ſmall iſland near the weſtern coaſt of Ireland, a little N. of Broadhaven; 3 miles S.W. of Browy Head.

Kid, a name applied to the young of the goat kind. See Goat.

Kid, in *Rural Economy*, a ſmall faggot of under, or bruſhwood.

KIDARNAUT, in *Geography*, a town of Thibet; 100 miles N. of Sirinagur. N. lat. 32° 4′. E. long. 79° 12′.

KIDDER, Richard, in *Biography*, a learned Engliſh prelate, of whoſe early life no account has come down to us. In the year 1649, he was ſent to Emanuel college, Cambridge, where he took his degrees. Two years afterwards, he was incorporated at the univerſity of Oxford. He was preſented by his college to the vicarage of Stanground, in Huntingdonſhire, from which he was ejected for non-conformity, under the Bartholomew Act, in 1662. Either the fear of ſuffering, or ſome other motive, ſoon brought him back to the boſom of the church, and he was, in 1664, preſented by the earl of Eſſex to the rectory of Raine. Here he continued about ten years, eſteemed by his connections, and in high reputation for learning, particularly for his extenſive and deep knowledge of the oriental languages. In 1674, he became rector in the metropolis, and, in 1681, he obtained a prebendary in the cathedral church of Norwich, which was ſucceeded by his nomination to the deanery of Peterborongh in the year 1689. About this period he took his degree of D. D. and in 1691 he was conſecrated biſhop of Bath and Wells. In 1693, he preached the lecture founded by Mr. Boyle, and afterwards inſerted his ſermons on that occaſion in his "Demonſtration of the Meſſias," of which work they conſtitute the firſt three chapters in the ſecond part. The biſhop continued his labours as an author till he was unhappily killed in his bed, together with his lady, by the fall of a ſtack of chimnies in his palace at Wells, during the great ſtorm in the night of Nov. 26th, 1703. He was eſteemed one of the beſt divines in his time. His largeſt work, next to that already mentioned, was "A Commentary on the Five Books of Moſes, with a Diſſertation concerning the Author or Writer of thoſe Books, &c." in 2 vols. 8vo. Biſhop Kidder was author of "The Life of Dr. Anthony Horneck," 1698: "Critical Remarks upon ſome difficult Paſſages of Scripture in a Letter to Sir Peter King," 1719, a poſthumous publication; ſeveral practical treatiſes; tracts on the Popiſh controverſy, &c. Biog. Brit.

KIDDERMINSTER, in Domeſday Book written *Chideminſter*, in *Geography*, a market town and pariſh in the hundred of Halfſhire, and county of Worceſter, England, is ſeated on the river Stour, at the diſtance of 13 miles of Worceſter, and 126 N.W. of London. In the year 1800, the town contained 1695 houſes, and 8036 inhabitants, the majority of whom were dependant on, or connected with, the manufactures of the place. In the time of king Henry VIII. Kidderminſter was noted for its manufactures, firſt of broad cloths, afterwards of wolſeys, and ſubſequently of bombaſines, crapes, and poplins. But early in the laſt century the carpet buſineſs was introduced here, and has been continued, with increaſing ſucceſs, up to the preſent time. In the year 1772, the town and its ſuburbs contained no leſs than 250 looms, and ſince that time a larger number has been employed. At firſt, the carpets made here were of the Scotch and flat ſpecies; but ſoon the cut carpets were invented, and this kind has ſince continued to be the diſtinguiſhed claſs of Kidderminſter. By ſundry charters from Henry II., Richard II., Henry VI., and Henry VIII., the inhabitants are granted an exemption from toll, pontage, and murage throughout the whole kingdom; all theſe privileges are alſo confirmed by a charter from queen Elizabeth. In this town the lord of the manor, or his deputy, occaſionally holds a court-leet, principally for the prevention of encroachments and public nuiſances; here is alſo a court of requeſt for recovery of debts under forty ſhillings. No county-juſtice has a right to exerciſe any judicial authority in this town, which is governed by a recorder and bailiff; the latter is annually elected by his brother aldermen, twelve in number, with the concurrence of twenty-five common-council-men, who collectively are enabled by charter 12 Charles I.

to make bye-laws for the government of the body-corporate and the trade of the town. It formerly ſent members to parliament. A market is held on Thurſdays for all ſorts of grain; but this article is now chiefly diſpoſed of by ſample: here are four annual fairs. The church, a large ſtructure of great antiquity, is capable of containing more than two thouſand perſons. In the choir are ſeveral ancient monuments belonging to the Bounts and Cookeſeys; alſo a croſs-legged effigy of the late ſir Thomas Acton. The tower is a ſtrong and lofty pile. The grammar-ſchool, to which all the inhabitants have the privilege of ſending their children free of expence, is at the eaſt end of the choir of the church: the preceptors, one deſcribed in the charter as the high, the other as the low maſter, are elected by certain feoffees, to which the conſent of the biſhop is always neceſſary: their annual ſtipend, upwards of 150*l.*, ariſes from buildings and lands with which the ſchool is endowed. The town-hall, which is principally conſtructed of brick, is roomy and elegant: a portion of the lower part is uſed as a priſon, but to the credit of the town, it is very rarely occupied: on what is called the ground-floor are erected ſtalls for the butchers: and, above is the council-chamber for tranſacting the buſineſs of the corporation. Kidderminſter, by the late inland navigation, has communication, by the junction of the Severn canal, with the rivers Merſey, Dee, Ribble, Ouſe, Trent, Darwent, Severn, Humber, Thames, Avon, &c.; which navigation, including its windings, extends above five hundred miles. The river Stour riſes in the celebrated groves of the Leaſowes, near Hales Owen, diſtant from hence about twelve miles, and after forming a large reſervoir at a village called Cradely, proceeds through Stourbridge, Kinver, and Wolverley, and enters Kidderminſter on the north ſide, tracing nearly its whole length, and thereby dividing it into two unequal parts. Over this little river, whoſe length is not more than twenty miles, part of which was once navigable, are now erected a great number of forges, ſlitting-mills, corn-mills, and other works of conſiderable utility: and to the fitneſs of its waters to the purpoſe of dyeing is attributed, in a conſiderable degree, the unequalled luſtre of the colours of the yarn uſed in the ſeveral branches of the weaving manufactory here, which, on this account, is juſtly eſteemed an inexhauſtible ſource of wealth to the inhabitants. The Staffordſhire and Worceſterſhire canal, completed in the year 1774, at the expence of 105,000*l.*, croſſes the Stour within one hundred yards from Kidderminſter market-place. In this town are three reſpectable reading ſocieties for cultivating the taſte of the wealthier inhabitants; and the inſtruction of the poor is not forgotten; for, excluſive of ſeveral Sunday ſchools, no leſs than eight charity ſchools are eſtabliſhed. Here are alſo twelve alms-houſes, and other charitable endowments. At Round-hill, in this town, is a chalybeate ſpring of great medicinal virtues; and in the vicinity are ſeveral others, of which that at Sandburn is the ſtrongeſt. Britiſh Directory, vol. iii. The name of Baxter was long held in veneration in this town. See his article.

KIDDERS, thoſe that badge or carry corn, dead victuals, or other merchandiſe, up and down to ſell: every perſon being a common badger, kidder, lader, or carrier, &c. ſays the ſtat. 5 Eliz. cap. 12. And they are called kiddiers, 13 Eliz. cap. 25.

KIDDLE, or KIDEL, *Kidellus*, a dam or weir in a river, with a narrow cut in it, for the laying of pots, or other engines to catch fiſh.

The word is ancient; for in Magna Charta, cap 24. we read, "omnes kidelli deponantur per Thameſiam & Medweyam & per totam Angliam, niſi per coſteram maris." And by king John's charter, power was granted to the city of London," de kidellis amovendis per Thameſiam & Medweyam." A ſurvey was ordered to be made of the weirs, mills, ſtanks, and kidells, in the great rivers of England, (1 Hen. IV.) Fiſhermen of late corruptly call theſe dams *kettles*; and they are much uſed in Wales, and on the ſea-coaſts of Kent.

KIDDOW, in *Ornithology*, the moſt common Engliſh name of the *lomwia*, a web-footed bird, common on our ſhores, and called in different places the guillemot, or guillem, and the ſea-hen and ſkout. See COLYMBUS *Troile*.

KIDED, in *Agriculture*, a term provincially applied to the pods of beans.

KIDELIA, in *Geography*, a town of Ruſſia, in the government of Viborg, on the N. coaſt of lake Ladoga; 48 miles N.N.E. of Kexholm.

KIDEROW, in *Rural Economy*, a term that ſignifies a place for keeping a ſucking-calf in.

KIDES, in *Geography*, a town of Sweden, in the government of Kuopio; 83 miles S.E. of Kuopio.

KIDGE, a fortified town of Perſia, in the province of Mekran. N. lat. 26° 30′. E. long. 61° 10′.

KIDNAPPERS, CAPE, a cape on the E. coaſt of New Zealand, diſcovered in 1769, and thus named by captain Cook, from an attempt made by the inhabitants to carry a boy from the Endeavour. It is remarkable for two white rocks like hay-ſtacks, and high white cliffs on each ſide. S. lat. 39° 43′. W. long. 182° 24′.

KIDNAPPING, in *Law*, is the offence of a forcible abduction or ſtealing away of a man, woman, or child, from their own country, and ſending them into another. This offence was capital by the Jewiſh law. (Exod. xxi. 16.) So likewiſe in the civil law, the offence of ſpiriting away and ſtealing men and children, which was callled "plagium," and the offenders "plagiarii," was puniſhed with death. (Ff. 48. 151.) This is unqueſtionably a heinous crime, as it robs the king of his ſubjects, baniſhes a man from his country, and may in its conſequences be productive of the moſt cruel and diſagreeable hardſhips; and, therefore, the common law of England has puniſhed it with fine, impriſonment, and pillory. (Raym. 474. 2 Show. 221. Skin. 47. Comb. 10) Alſo, if a maſter of a ſhip ſhall, during his being abroad, force any perſon aſhore, or wilfully leave him behind, or refuſe to bring home all ſuch men as he carried out, if able and deſirous to return, he ſhall ſuffer three months impriſonment. 11 & 12 W. III. c. 7.

KIDNEY, in *Anatomy*, a glandular body, ſituated in the abdomen, and ſecreting the urine.

The urinary apparatus conſiſts of two ſecretory organs (the right and left kidnies), by which the urinary fluid is ſeparated from the blood; of two membranous tubes (the ureters) by which this fluid is conveyed into a large muſculo-membranous reſervoir (the urinary bladder); and of a canal (the urethra) by which this reſervoir is evacuated at various intervals. The latter conveys the ſeminal fluid alſo in the male ſubject, and is therefore deſcribed in the article GENERATION. The different arrangement and conformation of the female generative organs occaſion the urethra to aſſume a very different form: it is here entirely unconnected with the generative functions, and we ſhall therefore deſcribe it in the preſent article with the bladder.

The eſſential parts of the urinary apparatus correſpond nearly to thoſe of the biliary organs; but there are ſome remarkable differences. The liver is always a ſingle organ. There are almoſt conſtantly two kidnies. The proportions of the ſecretory organ and the reſervoir are inverſe in the two caſes: the liver is ſo large as to exceed probably all the other glands in the body put together: the gall-bladder is comparatively ſmall: in the other caſe, the capacity of the reſervoir conſiderably exceeds the ſize of the glandular organs. A part only of the bile paſſes into the gall-bladder, the remainder flowing directly into the duodenum: and this ſecretion ſeems not to be very active in the intervals of the digeſtive proceſs. The kidnies, on the contrary, are always active, and the whole of the fluid which they ſeparate paſſes into the urinary bladder.

Two ſmall bodies, placed near the kidnies, and called the renal capſules, receive their veſſels for the moſt part from the renal: we ſhall therefore unite their deſcription with that of the kidnies.

The kidnies are placed deeply in the lumbar regions, at the ſides of the vertebral column. They are uſually two, a right and a left; but the number is expoſed to occaſional unimportant variations. Sometimes the two are united by their upper or lower extremities, ſo as to form a creſcent, with the concavity upwards or downwards, ſomething like the figure of a horſe-ſhoe, from which the gland, in theſe caſes, is ſometimes named: or, there may be an unuſually large one on either ſide, with two ureters, and a deficiency of the oppoſite gland: or, a ſmall ſupernumerary kidney on the front of the vertebral column. Other deviations from the accuſtomed ſtructure have been regiſtered by anatomiſts; but all theſe varieties are unimportant in phyſiology.

They are ſurrounded by a large quantity of fat, of a peculiar ſtructure and properties. This ſubſtance is contained in a looſe and eaſily lacerable cellular texture, which connects it to the kidney; it forms a complete caſe, iſolating theſe organs from the ſurrounding parts. Its quantity varies remarkably in different ſubjects, being ſo abundant as to hide the organs where the individual is very fat, and very ſparing in the oppoſite ſtate. This fat is remarkable for growing hard when it is cold, particularly in the ruminating herbivorous animals, where it is diſtinguiſhed by the name of ſuet.

On account of the different bulk of the liver and ſpleen, the two organs, which are placed immediately above the kidnies, the latter are ſomewhat differently ſituated on the two ſides of the body, the right being rather lower than the left: the difference in this reſpect may amount to an inch, but it is not conſtant. They both lie deeply buried behind the abdominal viſcera; the right having above it the renal capſule and the liver, and in front the colon and cæcum, the duodenum, and the other ſmall inteſtine; the left being covered by the ſpleen and pancreas, ſtomach, colon, and ſmall inteſtine.

The figure is juſtly compared to that of the kidney bean, with the concavity placed inwards. It is elongated from above downwards, convex in the greateſt part of its circumference, and rather broadeſt at its upper end. The ſize varies conſiderably, from four ounces in the adult to five, ſix, or even a pound: often one is conſiderably larger than the other.

In order to deſcribe more exactly the external form and the relations of the kidney, we divide it into two ſurfaces and a circumference. The anterior ſurface is ſlightly convex: ſometimes completely covered by the peritoneum, with the interſection of a ſtratum of variable thickneſs of fat and looſe cellular ſubſtance; and ſometimes in more or leſs immediate contact with the correſponding part of the colon: for in ſome ſubjects the membrane ſimply paſſes in front of the inteſtine, and binds it to the kidney, while in others there is a more or leſs looſe fold, called the lumbar meſocolon. From the right kidney the peritoneum riſes to the liver above, and even to the diaphragm; below, it paſſes to the colon and duodenum; on the left ſide it goes to the colon and ſpleen. Cellular ſubſtance, containing more or leſs fat, always connects the front ſurface of the kidney to the membrane; ſo that the gland is behind the cavity formed by that membrane, and would not be enumerated among the abdominal viſcera, if that epithet were confined to the parts contained within the cavity of the membrane.

The poſterior ſurface is nearly plane, and reſts on a thick layer of fat, which ſeparates it from the lower part of the diaphragm, from the anterior layer of the aponeuroſis of the tranſverſus, where it covers the quadratus lumborum, and from the pſoas magnus.

Thus, there is placed behind the kidney the thick maſs of ſoft parts, which extends from the pelvis to the cheſt, protecting the organ from all external injury, and rendering it nearly inacceſſible to the knife of the ſurgeon. It is alſo ſupported behind by the two or three laſt ribs. In its longitudinal direction it correſponds nearly to the two laſt dorſal, and the two neighbouring lumbar vertebræ.

The circumference of the kidney preſents a thick and rounded extremity above, covered by the concave baſis of the renal capſule; a thinner and more elongated end below, approaching more or leſs nearly to the criſta of the ilium: a convex, thick, and rounded edge, turned outwards, and correſponding to the muſcular parietes of the abdomen and the diaphragm; a deep excavation on the inſide, called the notch of the kidney. This notch has thick and rounded edges, and contains ſome fat. The diviſions of the renal artery occupy the upper and front part, thoſe of the vein are placed behind: the pelvis occupies the deepeſt portion, and the commencement of the ureter is ſeen below.

The conſiſtence of the kidney is remarkably firm, exceeding, in this reſpect, all other glandular organs. Its colour is reddiſh, with a tinge of brown; but the intenſity varies according to the quantity of blood contained in the veſſels. When an animal has died of hemorrhage, it is quite pale. The ſtructure of the organ comprehends a peculiar glandular tiſſue, arteries, veins, lymphatics, nerves, excretory tubes, and a peculiar membrane.

The proper tiſſue of the kidney is remarkable for its firmneſs. It will be beſt underſtood by carrying a ſection through the kidney, ſo as to divide it into an anterior and a poſterior half. We ſhall then be able to diſtinguiſh very clearly two ſubſtances; an exterior, which is called the *cortical* or *arterial*, and an interior, named the *tubular* or *uriniferous*. All kidnies are not equally well ſuited for this examination: in ſome, without any alteration from diſeaſe, the two ſubſtances are confuſed together. The contraſt of the two component parts is ſeen particularly clearly after minute injection.

The ſection of the kidney preſents to us alſo, diſpoſed in a ſtill more deeply ſeated ſtratum than the tubular part, a ſeries of ſmall bodies, called *papillæ* or *mamillæ*, which are merely the apices of the ſmall cones formed by the tubular ſubſtance. Many anatomiſts deſcribe theſe as a third ſubſtance, under the name of the *mamillary*. Laſtly, we obſerve the infundibula or calyces, and the pelvis, beſides the orifices of divided veſſels ſcattered here and there.

The cortical ſubſtance is ſo named becauſe it covers the exterior ſurface of the organ: it is about two lines in thickneſs. Its colour is a paliſh red, inclining to yellow: its conſiſtence is leſs firm than that of the tubular, and is about the ſame with that of the liver, ſo that it may be torn eaſily. It is ſmooth externally, and cloſely connected to the proper membrane of the kidney. Internally it is continuous with the tubular ſubſtance, and it forms prolongations

tions which fill the intervals of the different portions of the tubular matter. Theſe ſepta have been called the fleſhy columns of the kidney: they grow thinner as they approach the pelvis, round which there is always found ſome adipous ſubſtance. Their number depends upon that of the papillæ. The renal arteries are diſtributed almoſt entirely to the cortical ſubſtance: injections thrown into theſe veſſels penetrate it moſt eaſily, and colour it throughout: hence it has been concluded to be of a nature entirely vaſcular. Some anatomiſts have admitted the exiſtence of very ſmall glands in this ſubſtance, connected to the blood-veſſels as grapes are to their ſtalks; theſe are technically named acini. On tearing the cortical ſubſtance, ſmall granulations are obſerved on the torn ſurface, and minute granular bodies are ſeen in great abundance throughout this part of the kidney, where it has been minutely injected. Theſe are conſidered as the glands in queſtion, while ſome contend that they are only convoluted blood-veſſels. For an account of the controverſy on this matter, ſee Gland. The minuteneſs of the objects does not allow us to arrive at any ſatisfactory concluſion concerning their intimate ſtructure.

The tubular or uriniferous, called alſo the ſtriated ſubſtance, is lighter in its colour, more denſe and ſolid than the cortical. Injections do not penetrate it, but leave it in general quite colourleſs. It is compoſed of a vaſt number of ſmall tubes (tubuli uriniferi) united into conical faſciculi of unequal ſize. The rounded baſes of theſe faſciculi are turned towards the exterior of the kidney, and preſent diverging ſtriæ, which are loſt in the cortical ſubſtance: their apices are directed towards the notch. Theſe faſciculi are every where ſurrounded by the cortical ſubſtance, except at their apices, which are embraced by the infundibula. Each of theſe points forms a conical papilla, pierced by numerous ſmall apertures, which are the openings of the tubes juſt mentioned.

The papillæ, therefore, are ſimply the points of the cones which conſtitute the tubular ſubſtance: their number varies from five to eighteen. Generally there is a ſingle papilla for each cone; ſometimes two cones are united by one papilla, which is then larger; two papillæ are very ſeldom found on one cone. Their form and length are very various; they may be ſhort and rounded, or long and pointed. They are of a tolerably bright red colour, but ſometimes rather pale, while the reſt of the tubular ſubſtance is redder, or even of a violet hue at the baſis of the cones. Their ſurface is ſmooth, ſoft to the touch, and probably covered by a fine membrane. The orifices of the uriniferous tubes are ſeen on it, and as theſe are much leſs numerous than the ſtriæ of the tubular ſubſtance, probably ſeveral of the fine tubes unite together before they terminate. Compreſſion of the kidney cauſes the urine to tranſude at theſe pores; and the urine may be expreſſed in like manner, when the papillæ have been divided by a ſection perpendicular to the courſe of the tubes.

From the preceding deſcription of the two ſubſtances which compoſe the kidney, it appears, that the cortical performs the ſecretion, and that the tubular, completely unconcerned with this function, has the office of tranſmitting the ſecreted fluid. Thus it differs from all other glands of which the component ſubſtance is identical throughout.

That the arteries of the kidney are entirely diſtributed in the cortical matter is evident from anatomical injections: the exact mode in which they are connected to the uriniferous tubes hardly admits of being unravelled. The arteries ſeem to be continued towards the cones, where they are joined to the cortical matter, and injections often paſs from them into the uriniferous tubes, which are then ſeen running in ſtraight lines, and converging towards the papillæ. Ruyſch and others found that water, quickſilver, ſuet, wax, and air, thrown into the renal arteries, would come out at the pores of the papillæ, which is a ſtrong argument for the exiſtence of continuous tubes. A further proof of the ſame circumſtance has been drawn from the paſſage of actual blood in many inſtances by the urinary paſſages.

The baſis of each papilla is embraced by a ſmall membranous tube, into the cavity of which the apex projects. Theſe calyces, or infundibula, are ſurrounded externally by ſome fat, and are leſs numerous than the papillæ, becauſe two or three of the latter are ſometimes furniſhed with a ſingle tube. They are collected ordinarily into three trunks, which come reſpectively from the upper, middle, and lower parts of the kidney. Theſe three trunks open at the notch into the pelvis: ſometimes a greater number of branches opens into this membranous bag. The pelvis is placed at the deepeſt part of the notch, behind and between the diviſions of the renal artery and vein. It is moſt capacious in its middle, narrower at the two ends, and continued below into the ureter. The openings of the trunks formed by the union of the calyces, and of the ureter, are obſerved on its inner ſurface. Theſe are ſimple openings without any valvular apparatus. Sometimes there are two pelves to a ſingle kidney.

The pelvis and calyces are compoſed of a firm, white, and opaque membrane, connected by a looſe cellular texture to the ſurrounding organs, and having a ſmooth mucous ſurface internally, continuous with that of the ureter, and with the covering of the papillæ. Its ſtructure is denſe, and not very vaſcular; of its properties and action we know nothing. Bichat and Boyer diſtinguiſh three ſtrata in this membrane; an exterior, derived from the capſule of the kidney; a middle, or proper membrane, continued at the baſes of the papillæ into the ſubſtance of the organ; and an internal, or mucous coat.

The arteries and veins of theſe glands will be deſcribed in the articles concerning thoſe veſſels; we have only to point out a few circumſtances here concerning them. The renal arteries ariſe nearly at right angles, and paſs through a ſhort courſe before they arrive at their deſtination. Their diameter is very conſiderable in proportion to the volume of the organ. It is ſhewn by ſome calculations, the reſults of which cannot be received with very implicit confidence, that one-fourth or one-third of the blood of the abdominal aorta goes to theſe glands, conſequently, a very large proportion of the whole maſs. Hence the whole of the blood will have paſſed through the kidnies in a few pulſations of the heart. They are covered and accompanied by the renal veins; both veſſels divide near the kidney into ſeveral branches, which enter the notch and penetrate into the organ, accompanied by nerves and lymphatics. All theſe parts are ſurrounded by a looſe cellular tiſſue, continued apparently with that contained in the notch. The proper membrane of the kidney adheres to theſe faſciculi. The large branches occupy the intervals of the papillæ, and follow a winding courſe round the cones; the ſmaller ramifications form arches in the cortical ſubſtance, from the convexity of which numerous ramifications are [illegible] that ſubſtance. They ſeem to terminate [illegible] of the cortical and tubular parts by uriniferous t[illegible]. The veins have a diſpoſition analogous to that of the [illegible].

The lymphatic veſſels, diſtinguiſhed into ſuperficial and deepſeated, communicate frequently. They follow the courſe of the blood-veſſels, paſs out at the notch, and go to the lumbar glands.

The nerves, derived from the ganglia of the great ſympathetic, conſtitute the renal plexus, of which the branches ſurround the blood-veſſels, particularly the artery, and penetrate with it into the kidney. The kidnies ſeem to be hardly ſenſible in the natural ſtate: but diſeaſe, as, for example, inflammation, developes their ſenſibility in a very high degree.

The external ſurface of the kidney is cloſely inveſted by a peculiar membrane, ſometimes called the capſule, which adheres by means of ſhort and very fine threads, but can be ſeparated without much difficulty. It enters the notch, and is connected there to the calyces and blood-veſſels. It is very denſe and firm, ſemi-tranſparent, rather thicker than the peritoneum, and not diviſible into laminæ. Immerſion in boiling water makes it curl up and become thicker.

The ureter is the tube deſigned to convey the urine from the kidney, commencing from the inner and lower part of the pelvis of the kidney by a wide opening, ſometimes called infundibulum, and continued thence in a deſcending courſe to the inferior ſurface of the bladder, where it is not more than an inch diſtant from its fellow of the oppoſite ſide. Its ordinary ſize is about equal to that of a quill, except towards the lower extremity, where it is ſlightly contracted; but it varies in this reſpect in different ſubjects; and even in different parts in the ſame ſubject. Commonly there is one to each kidney, but ſometimes it is double.

From its origin it goes obliquely inwards and downwards as far as the front of the ſacro-iliac ſymphyſis, where it is ſeparated from the oppoſite one by the breadth of the baſis of the ſacrum. In this part of its courſe the peritoneum and the ſpermatic veſſels lie in front: the pſoas muſcle, which it croſſes at a very acute angle, is behind it. Lower down it croſſes the common iliac artery and vein. The right tube lies parallel to the outer ſide of the inferior vena cava. Several ſmall blood-veſſels are diſtributed on it. At the baſe of the ſacrum it paſſes forwards, downwards, and inwards through a large quantity of adipous ſubſtance, and advances towards the under ſurface of the bladder. Here it croſſes the vas deferens, and is placed a little above and externally to the veſicula ſeminalis, at which point it penetrates the bladder. It runs obliquely between the coats of that organ, paſſing for about an inch from without inwards and from behind forwards, between the muſcular and mucous coverings, and then opening into the cavity by a very narrow orifice placed at the poſterior angle of the triangular ſpace near the neck of the bladder.

The courſe of theſe tubes is the ſame in the female; they preſent no peculiarities worthy of notice in the pelvis of this ſex.

As the ureter is a continuation of the pelvis, we naturally expect to diſcover in it the ſame organization as in that bag. Anatomiſts deſcribe three coats; an exterior, thin, tranſparent, and of a cellular nature; a middle, which is thicker, and gives to the part its colour and conſiſtence; and an internal mucous covering, continuous with thoſe of the pelvis of the kidney and bladder, and habitually moiſtened, like them, with a mucous fluid capable of defending it from the action of the urine. Theſe ſtrata are, however, ſo cloſely connected, that it is almoſt impoſſible to exhibit them diſtinct. The blood-veſſels are derived from the renal, the ſpermatic, the aorta and vena cava inferior, and the iliacs.

The ureters, as well as the pelvis and calyces of the kidney, are very extenſible: their ordinary functions probably require the exerciſe of ſuch a property, as they muſt be ſubject to various conditions of plenitude and emptineſs. But diſeaſe elucidates this point moſt clearly: when the natural paſſage of the urine is obſtructed by a ſtone, or when it is diſturbed by difficulties in the evacuation through the urethra, the ureters are often enlarged very conſiderably, even in ſome caſes almoſt to the ſize of a ſmall inteſtine, and the pelvis, with its dependencies, undergoes an analogous dilatation.

Theſe parts do not ſeem to poſſeſs animal ſenſibility in their natural ſtate; but that property is manifeſted in them to the higheſt degree, by the paſſage of a ſtone, which cauſes perhaps torture as exquiſite as any diſeaſe of any organ in the body.

Their function of conveying the ſecreted urine from the kidney to the bladder, requires the exerciſe of tonic powers: the idea of this fluid finding its way by the force of gravity, is not only repugnant to the laws of the animal economy, but is irreconcileable with obvious phenomena. The adheſion of the ſides of the tube, where it penetrates the coats of the bladder, preſents an obſtacle, which can be overcome only by the exertion of ſome force; and this obſtacle is vaſtly increaſed in the diſtended ſtate of the bladder, during which the fluid is conſtantly finding its way into the receptacle. The only power in this caſe, by which the requiſite end can be obtained, is a contraction of the canal.

Developement of the Kidney.—In the fœtus all parts of the urinary apparatus are remarkable for their conſiderable advancement; and ſome are diſtinguiſhed by conſiderable peculiarities of conformation and ſtructure. The kidnies are very large, ſurrounded at firſt by a ſoft and reddiſh cellular tiſſue, but covered, before the end of utero-geſtation, by a ſmall quantity of granulated fat: this is moſt abundant behind, ſo that the peritoneum is almoſt immediately in contact with them in front. The external ſurface is tuberculated at this time: anatomiſts have ſometimes deſcribed the organ, as if the cones of tubular ſubſtance were imperfectly connected together as yet, ſo that each kidney might be regarded as an aſſemblage of ſmaller kidnies. This repreſentation is not correct; no traces of ſuch diſtinction are viſible in the interior; and the tubercles of the outſide, which correſpond to the baſes of the cones, ſeem to depend on the cortical matter being not completely developed. Some animals, as thoſe mammalia which either live in or frequent the water, have kidnies compoſed of ſmall kidnies connected by cellular ſubſtance. There is in theſe caſes a large number of cones, each ſurrounded by a ſtratum of cortical matter, and furniſhed with a calyx of its own: and theſe ſeparate pieces are only united by cellular ſubſtance. We may conceive the human kidney to be formed in this way, except that the ſeparate portions are blended into one maſs: and the diſtinction is only external even in the fœtus. A ſtructure of a deſcription quite oppoſite prevails in many other animals, particularly in all the feræ of Linnæus. The kidney in them conſiſts of a ſingle portion of tubular ſubſtance, with one papilla and calyx, and a ſingle ſtratum of cortical matter.

While the kidney retains this tuberculated exterior, the proportion of cortical matter is ſmaller than in the perfect gland; but the diſtinction between it and the tubular is well marked: the papillæ exhibit a very lively red colour. The gland at this time has conſiderable firmneſs, particularly if compared to the liver or ſpleen. The capſule is very perfectly formed, and ſeparates eaſily. The calyces, pelvis, and ureter are remarkable for their conſiderable progreſs: the latter, in particular, is nearly half as large as in the adult, in a fœtus of ſeven or eight months. Its ſize may be more accurately eſtimated if it be compared to the vas deferens, which is like a ſlender nervous thread, recognizable only by its whiteneſs.

No conſiderable change has taken place at the time of birth: although the kidnies are ſtill tuberculated, their figure is more preciſely determined, and the difference of the two conſtituent parts is ſtrongly marked. There is nothing remarkable about the pelvis or ureter. In the ſubſequent years fat is collected more abundantly about the kidnies: theſe organs, by acquiring a thicker covering of cortical matter, loſe their unequal ſurface, and gradually aſſume the form which characterizes them in the adult. The external membrane becomes more denſe, and more cloſely connected to the ſurface. The other parts experience no further change except that they partake of the general growth. In old age the kidnies become ſoft and flaccid; and the ſurrounding fat is diminiſhed in quantity. The external membrane preſents occaſionally points of a cartilaginous conſiſtence.

Phyſiology of the Kidnies.—The minute ramifications of the renal arteries, which compoſe ſo great a portion of the cortical ſubſtance of the kidnies, ſeparate from the blood the urinary fluid, which is conveyed along the tubuli uriniferi, and depoſited by their orifices in the calyces of the kidney. It then goes through the pelvis and ureter, and thus arrives at the bladder. The ſecretion goes on conſtantly, and the tranſmiſſion into the bladder is equally conſtant: for there is a continual efflux, when a catheter is placed permanently in the bladder, as alſo in thoſe examples of malformation, where the ureters open on the ſurface of the body. Ligatures placed on the ureters, or obſtructions of thoſe canals by other cauſes, as, for example, by ſtones, demonſtrate this courſe of the urine; the tubes are diſtended between the kidney and the obſtacle, and empty below.

That the urine is formed in the cortical ſubſtance of the kidney, is the amount of our knowledge concerning this part of the ſubject; the mode, in which the ſecretion takes place, is entirely unknown. This is the problem of ſecretion, towards the ſolution of which we have approached no nearer than the above general fact ſince phyſiology has been cultivated. In the preſent inſtance, indeed, it is not yet agreed whether the uriniferous tubes be continuous with the capillary arterial canals, or whether ſome organ be interpoſed between them. Hence all attempts to explain the peculiar nature of the urine from the ſtructure of the parts in which it is formed, and to ſhew how the properties of this fluid agree with the ſize, direction, curvatures, &c. of the canals, in which the ſecretion takes place, muſt be founded on grounds completely chimerical, although theſe reveries are ſanctioned by the reſpectable authority of Haller. (Element. Phyſiol. lib. 26. ſect. 4. § 5.) Another unaccountable error is committed by the ſame phyſiologiſt in his obſervations on this ſubject. He aſſerts that the urine is formed in the blood, and ſeparated only by the action of the kidney; and defends the opinion by ſtating that this fluid goes off by perſpiration, or by the ſtomach and inteſtines, when its ordinary paſſage is obſtructed. This notion is completely irreconcileable with the preſent ſtate of our knowledge concerning the chemical conſtitution of the blood and the urine; and the alleged facts, by which it is ſupported, are, to ſay the leaſt, of a ſuſpicious nature.

We may eſtabliſh, in the ſecond place, this fact; that the kidnies are the only organs in the body capable of forming urine, and that the ureters are the only paſſages by which fluids can be conveyed into the bladder. Yet both of theſe points are contrary to the opinions of ſome phyſiologiſts. When the evacuation of the urine from the body is ſtopped, ſome ſuppoſe that it is ſeparated by other organs. "It appears," ſays Haller (Elem. Phyſiol. lib. 26. ſect. 4. § 12.), "that the friction of the circulation, and the heat of the fluids produce in the blood acrid particles, tending to an alkaline nature, of which the more volatile are diſſipated by inſenſible perſpiration, while others, too large for the pores of the ſkin, can be ſeparated by the kidnies only. For, in all caſes of iſchury, where theſe particles are not ſeparated by the urine, either ſymptoms of acrimony take place in the whole body, or theſe matters are thrown off by other organs. Thus the ſweat and perſpiration have an urinous odour: or there is an urinous œdema of the whole body, or urine depoſited in the cellular ſubſtance, with violent and fatal fever. In other inſtances urine has been diſcharged by the ſalivary organs; by the ears or noſtrils, mixed with blood; by the mammæ; by vomiting, or ſtool; or it has become mixed with the fluid of the abdomen, or it has been depoſited in the brain, cauſing cephalalgia, blindneſs, delirium, ſtupor, convulſions and apoplexy. When ſecreted into the ſtomach, it cauſes hiccough and vomiting. Laſtly, the congeſtion of earthy ſubſtances in the blood, cauſed by iſchury, may produce ſandy matter in the ſweat." That a fluid, poſſeſſing ſuch very peculiar properties as the urine does, conſiſting of ſuch numerous and complicated elements, and ſeparated uſually in a very intricate glandular ſtructure, ſhould be formed alſo in almoſt every other kind of organic apparatus in the body; that it ſhould be ſeparated by the exhalants of the cellular ſubſtance, and of the ſkin, by thoſe of mucous and ſerous ſurfaces, by the veſſels of the brain, as well as by glandular organs, is a poſition ſo completely at variance with all that we underſtand of the compoſition and actions of the animal frame, that we could not receive it without very unexceptionable evidence. The whole quotation exhibits credulity rather than the deliberate caution neceſſary for eſtabliſhing ſo ſingular a fact, and the ſubjoined authorities are not at all calculated to remove our ſcruples. Perhaps an urinous odour has been ſometimes obſerved in the perſpiration; although we believe that even this has not been hitherto proved by very convincing evidence. Muſt we immediately conclude that the cutaneous exhalants have formed urine? When the biliary paſſages are obſtructed, and various fluids are tinged with bile, we explain the phenomena by the abſorption of that fluid from its natural receptacles. Will not the ſame explanation ſuffice for the caſes, if there are any ſufficiently proved, of urinous properties in the other ſecretions and exhalations of the body?

That there is ſome more direct paſſage from the alimentary canal to the bladder, than through the abſorbents, the general circulation, and the kidnies, is an opinion that has been partially entertained even from the moſt ancient times. The very rapid manner in which the urinary ſecretion is augmented by copious draughts of fluids, and the communication, within a very ſhort time, of particular properties to the urine, by certain ſubſtances taken into the ſtomach, are the circumſtances on which this opinion has been grounded. Anatomical inveſtigation has hitherto detected no ſuch paſſage; no diſſector has met with any tube that could poſſibly ſerve the purpoſe of forming ſuch a communication: while the experiment of tying the ureters corroborates this negative fact, by teaching us that no urine gains admiſſion into the bladder, when theſe tubes are obſtructed. "Galen," ſays Haller, (Elem. Phyſiol. lib. 26. ſect. 4. § 4.) "taught us long ago, that when the ureters are tied or divided in the living body, the urinary bladder is found empty, and that the animal evacuates no urine. This experiment has uniformly exhibited the ſame reſult in the hands of ſeveral very practiſed and dextrous experimenters; and Raſt lately repeated it on a dog, and found the kidnies ſweln and full of water, the papillæ dilated, the ureters enlarged above the ligature, and empty below, the bladder not containing a ſingle drop of urine." The phenomena of diſeaſe confirm the concluſions to which theſe trials lead: obſtructions of the ureters, and ſuppreſſion of the action of the kidnies, entirely ſtop the urinary diſcharge, whatever quantity of fluid the patient may drink.

This aſſertion of the exiſtence of a ſhort communication between the ſtomach or bowels and the bladder, againſt the evidence of anatomy and experiments, is founded on an aſſumption which we conſider to be highly queſtionable. We are ſo far from allowing that the abſorbents and blood-veſſels are inadequate to the explanation of the phenomena, that we believe the very reverſe to be true. We believe that the great abſorbing ſurface afforded by the alimentary canal, together with the infinite number of abſorbing veſſels, and the diameter of the thoracic duct, fully account for the conveyance of fluids into the blood; and that the large ſize of the renal arteries, which muſt circulate the whole maſs of blood through the kidnies ſeveral times in the courſe of a minute, with the great number of the uriniferous tubes, very ſatisfactorily explain the ſecretion of urine in any quantity of which we have examples. If theſe paſſages, which are obvious to our ſenſes, and large enough to allow a conſiderable quantity of fluid to paſs through them, cannot tranſmit the urine with ſufficient celerity, how ſhall we expect that a greater quantity can paſs through canals, which muſt be beyond all compariſon ſmaller, ſince no diſſector even conjectures that he has ever ſeen them? There is another and ſtill more fatal objection to theſe opinions: the fluids voided in theſe caſes are urine, of a very aqueous kind indeed, but ſtill urine;—ſtill that peculiar animal fluid, which is ſecreted only by a kidney. Now, if there be a direct paſſage from the ſtomach to the bladder, we ought to void, according to the nature of our drink, tea, wine, punch, cyder, &c. We muſt ſuppoſe, therefore, the exiſtence of an unknown kidney to convert theſe different fluids into urine, as well as of an unknown paſſage to convey them to the bladder. The exiſtence in the urine of particular properties, derived from certain articles of food, will prove nothing in this caſe, until we have been convinced that they cannot have been imported by the medium of the general circulation. Expoſure of the body to the vapour of turpentine will affect the urine, without its introduction into the ſtomach. (See the experiments under the article INTEGUMENTS.) What are the ſecret paſſages by which this is conveyed, in ſuch a caſe?

The urine is regarded as a fluid entirely excrementitious; as conſiſting of materials, which are either uſeleſs in the animal economy, or which, if retained, would be actually prejudicial. The fluids which we drink dilute the ſolid food, reduce it to that ſtate in which it conſtitutes the chyle, and are abſorbed with it. Probably a conſiderable portion is taken up immediately from the alimentary canal, without undergoing the previous change into chyle; ſince copious drinks often augment the urinary diſcharge much ſooner than the formation of chyle could be effected. The ſuperfluous fluid, thus introduced into the blood, is ſeparated by the kidnies, and very ſpeedily ſeparated, when large quantities are drunk: hence the chief component part of the urine is water. The organs of the body are conſtantly undergoing changes in their compoſition: they receive freſh particles from the blood, while the abſorbing ſyſtem removes the old ones; ſo that there is a perpetual movement over the whole body of combination and decompoſition. Again, a ſimilar change is inceſſantly carried on in the animal fluids. The lymph of the cellular texture and the ſerum of the circumſcribed cavities are at all times in this kind of circulatory motion. Theſe old materials are conveyed into the blood by the abſorbents, and ſeparated from it in the kidnies, in order to be thrown out of the body. They ſeparate it under the peculiar form denominated by the French chemiſts urée; which matter exceeds in amount by many times all the other ſaline ſubſtances diſſolved in the urine, and beſtows on that fluid its colour, odour,—in a word, all its peculiar characters. We ſhall anticipate, from this view of the matter, what the reſearches of modern chemiſtry have moſt clearly proved, that the component ingredients of urine are very numerous: it exceeds, in this reſpect, all the other animal fluids. A particular account of its ſenſible characters and chemical compoſition will be found under the article URINE; and that of the concretions occaſionally formed in the urinary paſſages under STONE.

No ſecretion exhibits ſuch ſignal variations as this: the term urine, therefore, is applied to fluids differing in almoſt every circumſtance from each other. The nature and proportion of its ingredients are not alike in the ſame individual, at the different periods of life. Peculiar characters diſtinguiſh it in the fœtus, the boy, the adult, and the old ſubject: they differ in the ſame day, according as a perſon is expoſed to heat or cold, as he is inactive or uſes much bodily exertion, according to the nature and quantity of the food and drink, and the length of time after meals at which it is voided; the ſtate of health, particularly of the ſtomach, and other digeſtive organs, and the paſſions of the mind, have alſo conſiderable influence.

The kidnies and bladder of the fœtus contain a very ſmall portion of fluid, which can hardly be deemed urine: it is almoſt entirely aqueous, rather viſcid and turbid, and has no ſmell or taſte. In the firſt years of life, the colour is not deep; the acrid and odorous properties are but ſlightly marked. As the motion of compoſition prevails, in almoſt all the organs, over that of decombination, the quantity of urée is ſmall. The earthy phoſphates, particularly that of lime, are not preſent, or in very minute quantities. While oſſification is incomplete, this ſubſtance is required for the developement of the bony ſyſtem. In the adult, where the growth of the body is complete, the reſidue of nutrition is more abundant, all the properties of the urine are more ſtrong. It contains ſalts, earthy phoſphates, phoſphoric acid, urée, and uric acid, according to the deſcription in the articles already referred to. The ſalts and the animal ſubſtance increaſe in the old ſubject; the phoſpate of lime is very abundant.

The modifications produced in the urine by heat and cold, which include alſo the effects of exerciſe, and the influence of the ſeaſons, are not the reſult of any direct action on the kidnies, but ariſe from the operations of theſe cauſes on the cutaneous functions. The relations between the urine and the external and internal exhalations are peculiar to this ſecretion. In proportion as we perſpire more abundantly, the urinary evacuation is diminiſhed; and the ſame circumſtance is obſerved in conſiderable dropſies. From this character, which belongs excluſively to the function of the kidnies, naturally ariſe the frequent variations in the quantity of the urine; while the other ſecretions are nearly always in uniform proportions. Expoſure of the ſurface to cold, or inactivity, is attended not only with an increaſed quantity of urine, but with alterations of its other properties: it is pale, not acrid, nor ſtrong in its ſmell. Warmth, with free perſpiration, or ſtrong exerciſe, diminiſhes the quantity, and renders it more highly coloured, acrimonious, and odorous. Slighter changes of an analogous nature may be remarked in winter and ſummer. (See INTEGUMENTS.) When the quantity of urine is ſo remarkably augmented in diabetes, the ſkin is parched and dry.

The quantity of food, and more particularly of drink, influences very greatly that of the urine; and ſeveral phyſiologiſts repreſent the two as nearly equal. The effect of aqueous drinks, however, will be conſiderably modified by the ſtate of the cutaneous diſcharge. If the individual be warm and ſtrong, a great part of ſuch drinks is diſſipated by the ſkin: in a weaker ſtate of the body, combined with external cold, it is diſpoſed of by the kidnies. The labourers in harveſt will often drink ſome gallons of liquor, while proſecuting their hard work under a hot ſun, without any increaſed urinary diſcharge; the perſpiration, however, is uncommonly copious, and its evaporation has a moſt favourable effect in keeping the body cool. The liquors which increaſe the urine moſt remarkably are thoſe of an aqueous kind, ſuch as water, vegetable infuſions, weak beer, cyder, &c. taken cold. Stimulating drinks, ſuch as the ſtronger wines and ſpirits, and warm fluids, excite the ſyſtem in general, and are more likely to be diſpoſed of by the ſkin. The quantity of urine, aſcertained by actual experiment, has varied conſiderably. The accounts of Hartman, Robinſon, De Gorter, Keil, Rye, Home, Sanctorius, and Linings, give us the following numbers of ounces in twenty-four hours; 28, 31, 36, 38, 40, 44, 50½, 64: the average of the whole will be 49 ounces.

The qualities of the urine are affected, in many inſtances, in a very obvious way by the nature of the food. As this ſecretion provides for the removal from the body of the reſidual and excrementitious part of our aliment, we cannot doubt that it muſt be very eſſentially influenced by the properties of the food. Rhubarb, beet root, madder, and other ſubſtances affect its colour. Fourcroy mentions a man, who conceived that he voided blood, but was perfectly free from pain, and all ſymptoms of urinary affection. He had eaten a large quantity of beet root for ſeveral days; and on leaving this off, the urine recovered its healthy appearance. (Syſt. des Connoiſſ. Chim. t. 10. p. 170.) Garlick and onions affect its ſmell; oil of turpentine gives it an odour reſembling that of violets; and aſparagus imparts to it a remarkable fetor. Several other vegetables, ſuch as fennel, carrots, parſnips, &c. produce alſo very ſenſible effects on its ſmell. A very ſtriking inſtance of change in its properties, produced by an alteration in the food, is afforded in the treatment of the diabetes mellitus by animal diet. See DIABETES.

The alteration of the urine by the food is more particularly evinced in individuals, whoſe digeſtive organs are not ſtrong: hence the ſtate of the urine is an important ſymptom in ſuch caſes.

Two or three kinds of urine are diſtinguiſhed, according to the interval between the repaſt and the time of evacuating the fluid. The firſt, diſcharged within a very ſhort time after drinking, is called urine of the drink (urina potus), or crude urine. It is often evacuated ſo ſoon after drinking, and has ſo little of the diſtinguiſhing characters of urine, that it has given riſe to the notion already mentioned of a ſhort communication between the ſtomach and bladder. It appears almoſt like a mere water, and has neither the ſmell, colour, nor weight of urine: it muſt be regarded as an extremely diluted form of the fluid, in which the urée is diffuſed in a very large proportion of water. The urine of digeſtion or concoction (urina chyli) is that evacuated two or three hours after a meal. Its colour and other urinous properties are more ſtrongly marked than in the preceding; but it is not yet perfect urine. It is affected by the nature of the food. The urine of the blood (urina ſanguinis) is voided ſeven or eight hours after eating, or in the morning after a night's ſleep. It is highly coloured and acrid, has a ſtrong taſte and ſmell, not that imparted by any particular food, but the peculiar urinous odour. The circumſtances of digeſtion and the nature of the food either do not affect this, or affect it in a much leſs degree. It contains a large proportion of ſalts and urée. Its characters, in ſhort, are thoſe deſcribed as belonging to urine; and it is always ſelected for the purpoſe of experiments on the chemical conſtitution of this fluid.

The paſſions have an influence on the nature of this fluid: fear, ſorrow, and, in general, the emotions which act violently on the frame, often cauſe an abundant flow of colourleſs and inodorous urine, which ſeems to conſiſt almoſt entirely of water.

But the effects of the cauſes which we have juſt conſidered, are very ſlight in compariſon with the changes produced by diſeaſe. The alteration in this caſe goes deeper, and the variations are more numerous and characteriſtic. Since the earlieſt ages of medicine, phyſicians have drawn indications from this ſource concerning the nature, progreſs, and termination of diſeaſes; and empirics have not overlooked ſo favourable an opportunity of levying a tax on public credulity. Careful analyſes of the various morbid urines are ſtill among thoſe deſiderata, which promiſe very intereſting reſults to the phyſiologiſt and pathologiſt. A few facts only have been collected on this ſubject. The ſediment of the urine, at the termination of acute diſeaſes, has been found to conſiſt chiefly of uric acid. The colourleſs fluid voided in nervous diſorders, in hyſteric paroxyſms, &c. is little more than mere water. Phoſphoric acid and phoſphate of lime are not found in the urine during the paroxyſm of gout; but the latter returns towards its ceſſation, and is even more abundant than in the healthy ſtate. In thoſe affections, in which the bones become ſoftened, the urine has a large proportion of phoſphate of lime: the earth abſorbed from the bones is evacuated by the kidnies. During utero-geſtation, this earthy ſalt is not found in the urine. For the remarkable qualities of this fluid in *diabetes*, ſee that article. The ſecretions of the mucous membranes, over which the urine paſſes, may variouſly modify its properties; and diſeaſes of theſe parts may occaſion the admixture of blood, pus, mucus, &c.

The laſt circumſtance we have to mention concerning the urinary ſecretion, diſtinguiſhes it from all others; *viz.* that the ſecreted fluid is concerned in no other function, but is entirely expelled from the body, after traverſing the urinary paſſages. In other inſtances the ſecreted fluids ſerve ſome office; the tears lubricate the ſurface of the eye; the action of the ſaliva in aſſiſting maſtication is very important; the bile and pancreatic juice concur in digeſtion. Hence the alterations in the quantity or qualities of theſe are followed by ſerious conſequences; while the changes of the urine, particularly in quantity, are hardly obſerved.

The *renal capſules* (capſulæ ſuprarenales, or atrabilariæ, renes ſuccenturiati) are two ſmall bodies, a right and a left, placed above the upper extremities of the kidnies, which they cover to a certain extent, and behind the peritoneum. They are ſometimes double on one or both ſides. Their ſize varies much according to the age of the ſubject: in the firſt months of fœtal exiſtence they are at leaſt as large as the kidnies, and they continue to grow until the firſt years after birth: but as this growth is much leſs rapid than that of the kidney, the proportionate ſizes of the two organs are ſoon entirely changed, and become ſuch as we find them in the adult. When they have acquired their greateſt magnitude, they ſometimes preſerve it in the adult; or they are gradually diminiſhed, and at laſt diſappear almoſt entirely. Their figure does not much reſemble any known object; it is ſomewhat triangular, and bent from above downwards. We may diſtinguiſh in them an anterior and a poſterior ſurface, a ſuperior and an inferior margin, an internal and an external extremity.

The anterior, which is alſo the broadeſt ſurface, preſents, a little above its middle, a tranſverſe groove, which receives the chief capſular vein: this correſponds, on the right ſide, to the inferior vena cava and the duodenum; on the left, to the ſpleen and pancreas. The poſterior ſurface is in contact with the ſemi-lunar ganglion and the diaphragm. The inferior edge, which from its breadth has been deſcribed as a ſurface, is excavated obliquely from before backwards, and from above downwards, and embraces the ſuperior end of the kidney. The ſuperior margin, thin and convex, is rather inclined inwards, correſponding to the liver on the right, and to the ſpleen on the left ſide. In the extremities there is nothing remarkable: the inner is rounded and rather lower than the outer, which is more pointed. The whole exterior is unequal, with an appearance of ſmall lobes, and adheres to the neighbouring parts by numerous veſſels, by nerves and by a looſe adipous ſubſtance, continuous with that which ſurrounds the kidnies. This ſubſtance in moſt caſes nearly reſembles the capſules themſelves in colour, ſo that they may be eaſily overlooked in a ſuperficial examination.

A kind of triangular cavity occupies the middle of the capſule, with an oblong eminence, cauſed by the courſe of a vein projecting into it below: the ſides of this hollow often appear united by a kind of downy matter. It contains a fluid of a reddiſh colour in the fœtus, yellow in young ſubjects, and brown in the adult. Its conſiſtence and quantity are variable; and it is coagulable by alcohol. It has been aſſerted that this cavity may be inflated by the capſular vein; but Haller could not ſucceed in attempting this in the human ſubject, although he accompliſhed it in animals. Some deny the exiſtence of a cavity, and others have aſſerted that it is a vein. Haller ſaw it clearly ſixteen times in the human ſubject: it was not obſervable in three inſtances.

The colour is a browniſh-yellow, and deepeſt in the interior: it has more of red in the fœtus and in children. The form at that time is more rounded, the volume more conſiderable, and the fluid more abundant. Their conſiſtence is moderately firm; more ſo on the outſide than in the internal portion, in the adult than in the child. They are compoſed of lobes diviſible into lobules, which may again be reduced into ſmaller portions. The ſurrounding cellular ſubſtance enters the organ and joins together theſe portions. In this reſpect the ſtructure of the renal capſules reſembles that of the conglomerate glands; but no excretory duct has been diſcovered in them.

Their arteries are numerous, and divided into ſuperior, which come from the lower diaphragmatic, middle from the aorta or cæliac artery, and inferior, which ariſe from the renal. They anaſtomoſe frequently, and ſeem to run on the ſurfaces without entering the ſubſtance of the organs. The veins are leſs complicated. There is always a large one on each ſide, produced from the inferior vena cava on the right, and from the renal vein on the left ſide. It enters the groove of the anterior ſurface, and after running through it, paſſes into the neighbouring adipous ſubſtance, and to the lower part of the diaphragm. The branches enter the ſubſtance of the capſules, but probably do not open into the cavities, as ſome have ſuppoſed.

Lymphatic veſſels ariſe from all points of theſe organs, and ſeveral join thoſe of the kidney. On the right ſide they go to ſome lymphatic glands placed round the vena cava, below the liver; or they are united with the abſorbents of the liver, and proceed with them to the thoracic duct. On the left ſide they enter glands placed in front of the left crus of the diaphragm.

The nerves of the renal capſules come from the cæliac ganglia and from the renal plexuſes.

Phyſiology of the renal Capſules.—The uſe of theſe bodies is entirely unknown: the phyſiologiſt or pathologiſt has not hitherto noticed one fact that can throw the ſmalleſt light on their office, or that can prove them to poſſeſs any connection with any function of the animal economy. "From an attentive conſideration of all circumſtances," ſays Haller (Elem. Phyſiolog. lib. xxvi. ſect. 4, § 14.) "I can venture to affirm nothing further of theſe capſules, than that they ſecrete a fluid, which is more neceſſary to the life of the fœtus than to that of the adult. I can draw nothing from comparative anatomy, except the probable conjecture, that they are made for important purpoſes, as they are found in ſo many animals. They are large, and have a large cavity in the carnivorous, as the tiger, and in ſome herbivorous animals. But in other herbivora they are ſmall, and the cavity is ſmall in the voracious ſhark."

The urinary bladder, or muſcular and membranous reſervoir for the urine, is placed at the middle and anterior part of the pelvis, behind the bones of the pubes; before the rectum in man and the uterus in woman; below the ſmall inteſtine, above the lower part of the rectum, the vaſa deferentia and veſiculæ ſeminales in man, and the vagina in woman. This is the natural ſituation of the bladder in the adult, but age and various circumſtances produce changes in this reſpect, which it is important to obſerve. In the fœtus the bladder is ſituated almoſt entirely out of the pelvis, and reaches nearly to the navel, in the midſt of the cellular ſubſtance, which occupies the lower and front part of the abdomen, externally to the peritoneum. Hence it follows, that at this age its anterior ſurface is covered by the peritoneum only at the upper part, and that in the reſt of its extent it correſponds immediately to the oſſa pubis and the recti and tranſverſi abdominis. It may accordingly be opened above the pubes, even in its empty ſtate, without wounding the peritoneum. This peculiarity of poſition ariſes from the bladder being greatly developed in proportion to the neighbouring organs, and eſpecially from its being very elongated, while the pelvis is ſmall and very ſhallow: the upper aperture moreover is very oblique, and the rectum, diſtended by a large quantity of meconium, particularly towards the latter periods of pregnancy, almoſt entirely fills the pelvis. As the cavity of the latter is developed, the bladder ſinks in it, and retires from the umbilicus. At three years of age it is ſaid to riſe hardly more than three fingers' breadth above the pubes, and at twelve this is reduced to about half an inch: at eighteen it is ſaid to be completely hidden behind the bone. Haller, however, obſerves, that he has ſeen the length of this viſcus remaining even to the time of puberty, ſo that it ſtill projected conſiderably above the pelvis. In the adult, where the pelvis is deep, and the bladder ſhorter, not exceeding the bulk of an egg in its undiſtended ſtate, it never riſes above the pubes when empty; and even at other times is generally below the upper edge of the bone. But when it contains a large quantity of urine, it aſcends and forms in the hypogaſtric region a very diſcernible tumour, which riſes and increaſes gradually, in proportion as the quantity of contained fluid becomes greater. It may reach in theſe caſes beyond the umbilicus. It is contained in the abdomen in the latter months of pregnancy. Perhaps it may be inclined rather more backwards in the ſupine poſition of the body. It has ſometimes been contained in an inguinal or vaginal hernia. Its ſituation is not always perfectly ſtraight, but ſometimes, as Celſus has obſerved, rather inclined to the left. It is retained in its ſituation by cellular ſubſtance, which ſurrounds it on all ſides, and by other means, which will be deſcribed preſently.

The capacity of the organ differs according to the age, ſex, and diſeaſes. It is much greater, in proportion to the ſize of the body, in children than in adults: it diminiſhes afterwards as it ſinks in the pelvis. It is larger in perſons who have the habit of retaining the urine for a long time, than in others; and on this account it may be larger in ſome females. In caſes of retention of urine it ſometimes is ſo enlarged as to hold ſeveral pints: and it is diminiſhed in a correſponding degree in other affections, as when it is irritated by the conſtant preſence of a ſtone, or by any other cauſe. We can hardly aſſign any particular capacity as the natural one, there is ſo much variety in different individuals: a healthy perſon may void, at one time, from half a pint or leſs to two pints.

The figure of the bladder, in an adult male, is nearly that of an oval, rather flattened from before backwards, with the large extremity placed downwards and a little backwards, and the ſmaller in the contrary direction. In females, and particularly in thoſe who have had many children, it is not ſo high, but broader in the tranſverſe direction. It is very elongated, and nearly cylindrical, in the fœtus, at which time its extremity, formed by the urachus, approaches the navel: its length is three times its breadth, and its tranſverſe diameter is nearly equal to the antero-poſterior. At no long period after birth theſe dimenſions change, the bladder becomes more rounded, and aſſumes a ſomewhat pyriform figure; and, as the child grows, the figure approaches more and more to the oval. Several anatomiſts diſtinguiſh in the bladder a ſuperior portion, which they call the fundus; a middle part, or body of the bladder; and an inferior diviſion, comprehending the lower ſurfaces and the neck. We ſhall divide the organ into two ſurfaces, an external and an internal.

The external ſurface may be naturally divided into ſix regions: *viz.* an anterior, a poſterior, a ſuperior, an inferior, and two lateral, or right and left.

The anterior, which is ſlightly inclined forwards, *is* bounded above by the urachus, and below by the neck of the bladder. At its lower part are ſeen two ſmall fibrous faſciculi, called anterior ligaments of the bladder. They have a horizontal direction, and are attached to the back of the ſymphyſis pubis in front, to the ſuperior portion of the neck of the bladder, and to the proſtate behind. This region then correſponds to the flattened poſterior ſurface of the oſſa pubis and their ſymphyſis, to which it is connected by a looſe cellular ſubſtance. When the organ is empty, or moderately filled, it does not aſcend above the bone; but in the diſtended ſtate it riſes out of the pelvis, and correſponds immediately, without the interpoſition of the peritoneum, to the abdominal muſcles. Hence, at this time it may be perforated by a trochar, or opened for the extraction of a ſtone, without expoſing the patient to an effuſion of urine in the abdominal cavity.

The poſterior ſurface, ſlightly inclined upwards, is convex, ſmooth, entirely covered by peritoneum, contiguous to the rectum in the male, and to the uterus in the female ſubject, and to the inferior convolutions of the ſmall inteſtine in both ſexes.

The lateral regions, which are broader below than above, are covered by peritoneum in their poſterior portion only: in front they are connected to the ſides of the cavity of the pelvis by a large quantity of cellular tiſſue. The umbilical arteries, and the vaſa deferentia, paſs along them.

The ſuperior region is commonly called the fundus of the bladder; it correſponds to the convolutions of the ſmall inteſtine, and affords attachment to the ſuperior ligament of the bladder. The latter is compoſed of the urachus and of the two umbilical arteries, each of which is here included in a ſmall falciform portion of peritoneum. The urachus, occupying the middle of this ligament, appears in the adult under the form of a whitiſh fibrous cord, extended from the fundus of the bladder, on the external ſurface of the peritoneum, to the umbilicus, where it is confounded with the aponeuroſes of the tranſverſe muſcles. It is about as thick as a ſmall quill at the bladder, but it grows gradually ſmaller towards the navel. It poſſeſſes no interior cavity, and ſeems capable of no other uſe than that of fixing the bladder in its ſituation. Inſtead of being ſolid and ligamentous, it is ſaid ſometimes to form a true canal, by means of which the urine eſcapes at the navel: this unuſual appearance, which we have never ſeen, is ſaid to ariſe from obſtruction at the neck of the bladder, and to ceaſe as ſoon as the urine flows through the urethra.

The elongated figure and great elevation of the bladder in the fœtus, make the urachus very ſhort; it then forms a canal, beginning from the upper part of the bladder: thence it aſcends to the umbilicus, becoming at the ſame time contracted. Laſtly, it enters this ring with the umbilical arteries, and is continued into the cord: according to Haller, it may be filled with mercury for an inch, or an inch and a half. Farther on, it is ſaid to be divided into ſeveral filaments, which are loſt on the arteries: but Mr. Cruikſhank ſtates that it is continued, in the form of a very ſlender thread, throughout the cord. In quadrupeds it is manifeſtly hollow, and paſſes through the cord to a membranous bag called the allantois, in which it ends. Its diameter is variable: in general it is not more than one-third of a line in breadth, and it opens into the bladder by an orifice, which is ſo ſmall and difficultly found, that many good anatomiſts have altogether denied its exiſtence. Sometimes it is conſiderably larger in this ſituation. Haller ſays that he has expreſſed from it a drop of gelatinous lymph, and others ſpeak of urine as contained in it. Its conſiſtence is firm; it ſeems to be formed by a prolongation of the internal coat of the bladder, incloſed by long and hard fibres continued from the muſcular coat. It is cloſed, and becomes ſolid and ligamentous ſome time before birth: its cavity is obliterated, like that of the umbilical veſſels, and it can no longer be dilated, or receive urine. Sometimes, however, it remains open: Haller introduced a hog's briſtle into it in the adult, and he mentions gravel being contained in it in another inſtance. In 1787, ſays Boyer, I diſſected the bladder of a man thirty-ſix years old, whoſe urachus formed a canal an inch and a half long, and contained twelve urinary calculi of the ſize of millet ſeeds. I aſcertained that the containing tube was not a ſacculus or elongation of the internal coat through the muſcular tunic. Theſe examples of a hollow in the urachus of the adult are very rare.

As the exiſtence of a canal in this part is ſometimes denied, we ſubjoin the following expreſs teſtimony of Haller on the ſubject. "Doubts have been entertained whether the urachus be hollow, ſince we often find that nothing paſſes into it, when the bladder is diſtended with air or mercury; and ſeveral good anatomiſts have found no canal. But the repeated inveſtigations of this matter by myſelf, and by one of my pupils, have plainly ſhewn that a foramen leading into the urachus exiſts at the top of the bladder in the human fœtus. When the ſurrounding cellular ſubſtance has been removed, and the fold, which is ſometimes formed between it and the bladder, is deſtroyed, air, quickſilver, or a briſtle will enter eaſily: I have alſo ſqueezed out a drop of gelatinous fluid, and others have found urine in the cavity. It may be demonſtrated as far as the umbilicus." Elem. Phyſiol. lib. xxv. ſect. 2.

The two umbilical arteries, which are conſtantly obliterated in the adult, form merely ligamentary cords of a cylindrical figure, placed at the ſides of the urachus, and adhering like it with tolerable firmneſs to the peritoneum.

The falciform proceſſes of the peritoneum are neceſſarily and mechanically produced by the reflexions of that membrane on the three ligamentary cords juſt deſcribed: they raiſe the membrane from the ſides of the cavity, and make it project into the abdomen in the form of three ſmall elongated folds, of which the middle ſurrounds the urachus, and the two lateral ones the umbilical arteries. They are broader below than above, and more ſtrongly marked in the fœtus than in the adult. They are united and blended at the navel, but ſeparate as they deſcend; the middle, which is vertical, and correſponds to the linea alba, terminating on the fundus of the bladder, the lateral ones, which diverge, on the ſides of the organ.

The lower region, which is alſo called the baſis of the bladder, is rather more extenſive from ſide to ſide than from before backwards. It is ſubdivided into an anterior and a poſterior portion: the former, rather more elevated than the latter, is narrow, ſhaped like a funnel, and called the neck of the bladder. It is embraced by the proſtate, and correſponds to the poſterior and inferior part of the ſymphyſis pubis. The poſterior part is large and expanded: it is bounded behind by the kind of cul-de-ſac which the peritoneum forms as it is reflected from the back of the bladder to the rectum. This part covers, in man, the veſiculæ ſeminales and vaſa deferentia, which are united to it by cellular tiſſue, cloſe in front near the proſtate, and looſer behind: in the triangular interval, ſeparating the vaſa deferentia, the ſurface of the bladder is in contact with the rectum, and connected to it by a looſe abundant cellular ſubſtance, containing fat and interſperſed with numerous blood-veſſels, particularly veins. In the female this part of the bladder correſponds to the front of the vagina. The ſides of this lower portion of the bladder are covered in both ſexes, by the levatores ani, and correſpond to the intervals between the anus and the tuberoſities of the iſchia.

The internal ſurface is poliſhed and covered by an abundant mucous ſecretion. It preſents a great number of wrinkles, more or leſs ſtrongly marked, taking various directions, and formed by the internal membrane. Theſe are very apparent when the bladder is empty and contracted, but are effaced almoſt entirely when it is dilated. They ariſe from the unequal contraction of the muſcular and mucous tunics, of which the latter poſſeſſes a much leſs degree of contractility than the former. In ſome ſubjects there are ſeen, beſides theſe wrinkles, elongated prominences, reſembling in many points the muſcular columns of the right auricle of the heart. Theſe are formed by the fibres of the muſcular coat, diſpoſed in large faſciculi, and elevating the mucous membrane ſo as to project towards the bladder. Correſponding depreſſions are left between theſe columns, which have given riſe to a particular name in French (veſſies à colonnes), diſtinguiſhing the bladders with this appearance. Beſides theſe depreſſions, there are ſometimes cells or pouches of various ſizes and number opening into the cavity. Stones may be contained in ſuch cells, and are then called encyſted.

The anterior, poſterior, and lateral regions of the internal ſurface of the bladder, preſent nothing beſides what we have juſt particularized. In the ſuperior region there is a ſmall pore in the fœtus, often ſcarcely viſible, and conſtituting the commencement of the urachus, which we have already ſpoken of. The inferior region offers to our view, in ſucceſſion from before backwards: 1ſt, the neck of the bladder; 2dly, the triangular ſpace; 3dly, the inſertion of the ureters; and, 4thly, the inferior ſurface or bottom of the bladder.

The neck of the bladder, or orifice of the urethra, is a tolerably large circular opening with thick ſides, contracted a little to form the urethra properly ſo called. It occupies the moſt depending part of the bladder in the fœtus, becauſe the bottom of the organ (basfond in French) is not developed at that time. In the adult, the neck of the bladder is rather higher than the inferior ſurface; ſo that there is a ſlight declivity from the former to the latter, directed from before backwards and from above downwards. The circular figure of the opening in the neck of the bladder is ordinarily interrupted by a fleſhy tubercle, ariſing from its lower portion, and called by Lieutaud, who firſt deſcribed it, luette veſicale, or uvula veſicæ. Its ſize varies, inſomuch that it is often ſcarcely viſible. It is ſubject to enlargement, particularly in old perſons, and then it forms an oblong tumour, rounded at its upper margin, and, by its ſituation, rendering the expulſion of the urine difficult. However, we ſometimes find it ſwoln in the dead body when the bladder has not been diſtended. It ſeems to be chiefly formed by the internal membrane of the bladder, and to be merely the termination of the anterior angle of the triangular ſpace. It is deſcribed by Mr. Home, in a paper contained in the Philoſophical Tranſactions, as a third lobe of the proſtate gland. (See the deſcription of that gland in the article GENERATION.) In the natural ſtate, the neck of the bladder is cloſed, except during micturition; and is only opened for the evacuation of the urine. It is ſurrounded externally by the proſtate gland. (See GENERATION.) The opening is larger in the female; where, if it depended on the proſtate, we ſhould not expect to find a luette veſicale: yet Lieutaud aſcribes it equally to that ſex.

The trigonum veſicæ (trigone veſicale in French) is a triangular portion, bounded by three openings, which mark its three angles. Theſe apertures are diſtant from each other about an inch, or an inch and a half, and are, in front, the opening of the urethra already deſcribed, which forms the apex of the triangle; behind and laterally, the openings of the two ureters. The ſurface is a little inclined backwards, and juſt prominent enough to allow of the fact being obſerved. It is much leſs wrinkled than other parts of the bladder, and may alſo be diſtinguiſhed by its colour, which is not the ſame in all ſubjects, but conſtantly different from that of the reſt of the organ, and generally whiter. The anterior angle, or apex, which is confounded with the luette veſicale, is nearly three or four times its thickneſs; it grows thinner towards the baſis. Its thickneſs and colour, and the ſtrong adheſion of the internal membrane, lead us to ſuppoſe that its organization is peculiar. It preſerves nearly the ſame extent in the contracted bladder, and is then more prominent. It is more extenſive in the female than in the male bladder.

The openings of the ureters, occupying the two poſterior angles of the triangular ſpace, are narrow, elongated, and directed obliquely forwards and inwards. Their diameter is much ſmaller than that of the ureters, and they often appear to be covered by ſmall folds of the internal membrane, which it is neceſſary to elevate with a probe in order to ſee them clearly. The introduction of the probe ſhews us the obliquity of the canals, and the extent of their courſe between the two coats of the bladder, a point which we have already mentioned in ſpeaking of the ureters.

The bottom of the bladder is a large hollow ſituated behind the triangular ſpace, and below the level of the neck: it is, in fact, the moſt depending part of the organ.

The ſides of the bladder become thicker in proportion as the organ contracts, and they are rendered thinner when it is dilated. They conſiſt of a ſerous, a muſcular, and a mucous coat.

The firſt of theſe inveſts only the poſterior region, and a ſmall portion of the lateral regions. In the fœtus it covers alſo a ſmall part of the front and upper portion of the organ. Its external ſurface is perfectly ſmooth, and moiſtened by a ſerous ſecretion. The internal ſurface is connected to the muſcular covering, by cellular ſubſtance, in ſuch a way as to admit with tolerable facility of ſeparation by diſſection. This covering is furniſhed by the peritoneum, which paſſes from the front of the abdominal cavity, that is, from the recti muſcles or the oſſa pubis, to the fundus of the bladder, then deſcends over the poſterior to the inferior ſurface of the organ. Here it quits the bladder, and paſſes to the front of the rectum in men, to the anterior ſurface of the uterus in women. As it goes from one to the other of theſe organs, it forms on the ſides the two folds improperly called poſterior ligaments of the bladder, and in the middle a cul-de-ſac, which is the loweſt portion of the peritoneal cavity in the male ſubject. This part may become diſtended with the fluid of aſcites; and, as the cul-de-ſac juſt mentioned extends to within two or three inches of the anus in many ſubjects, the paracenteſis of the abdomen might be performed, in the male ſubject, from the rectum; indeed this has been actually done in one inſtance. The cul-de-ſac formed in the female, by the reflexion of the peritoneum from the vagina to the rectum, would allow a ſimilar operation, in that ſex, from the poſterior part of the lower ſurface of the vagina.

Where this ſerous covering does not exiſt, the bladder is covered by a layer of cellular tiſſue, the thickneſs and appearance of which are not every where uniform. At the anterior region, behind the pubes, and on the lateral regions, it is very looſe and abundant, and uſually contains more or leſs fat. At the inferior ſurface it is leſs copious, but ſtill looſe, and containing little or no fat; a conſiderable number of veſſels, particularly veins, is ſeen here. It is denſe and whitiſh about the veſiculæ ſeminales and proſtate.

The muſcular coat ſurrounds the bladder at all points; correſponding, by its external ſurface, to the ſerous tunic, and to the cellular ſubſtance; by its internal ſurface, to the outſide of the mucous coat. It is compoſed of a thin ſtratum of pale fibres, diſpoſed in faſciculi of various ſizes, croſſing each other in all directions, ſo as to form a very cloſe network, of which the interſtices preſent every variety of ſize and figure. Ordinarily the mucous coat is completely covered by this muſcular tunic; but ſometimes there are ſmall ſpaces without any muſcular covering. Through ſuch ſpaces the mucous membrane may be protruded, ſo as to form the cells already mentioned, communicating with the cavity of the bladder.

An attentive examination of the muſcular fibres ſhews us, that ſome have a longitudinal, others a nearly circular direction; that ſeveral are oblique, and that the reſt compoſe an inextricable network. The longitudinal fibres, forming the exterior ſtratum, are directed from the neck to the fundus of the bladder. The anterior ones ariſe from the proſtate and its covering, and ſometimes from the poſterior and inferior part of the pubes, and the front ligaments of the bladder; in the female, from the point of union of the bladder with the urethra; they aſcend over the front of the organ to its upper part, and afford to the urachus the external covering already mentioned. The poſterior fibres form more numerous and larger faſciculi than the anterior: they paſs from the urachus, over the poſterior and inferior ſurfaces, to the proſtate in man, and to the junction of the bladder and vagina in woman. Both theſe portions ſend off fibres laterally, which cover the lateral regions, decuſſate with each other, and with thoſe of the more deeply-ſeated ſtrata. As all theſe fibres have their fixed points in the proſtate and neck of the bladder, they will draw the other parts of the organ, which are all more or leſs moveable, to the neck, and conſequently preſs the urine againſt the orifice of the urethra.

The oblique fibres are leſs diſtinct and more deeply-ſeated than the longitudinal; and are ſo blended with the others that it is almoſt impoſſible to obſerve any order in their diſtribution. Some have a tranſverſe direction, and embrace the bladder almoſt in a circular manner: the more deeply-ſeated they are, the more they approach to this courſe; yet ſeveral longitudinal faſciculi may be ſeen in the interior of the organ. The contraction of theſe fibres diminiſhes the capacity of the organ in all its diameters, and tends to bring its ſides in all directions towards their common centre. The urine, thus forced on all ſides, will eſcape in the direction where there is the leaſt reſiſtance; that is, the neck of the bladder, againſt which it is moreover forced by the contraction of the longitudinal fibres.

From its office of expelling the urine, the muſcular coat of the bladder is frequently deſcribed as a muſcle, under the name of detruſor urinæ. It will be readily underſtood, from the account which we have juſt given of its action, that the bladder is brought into a flattened ſtate, and lies wholly juſt behind the pubes, when this covering has contracted. The fixed point of the organ is behind thoſe bones; the proſtate and neck cannot move, and all the other parts are drawn towards them. In this ſtate the organ is flattened before and behind, and has a triangular outline; the fundus forms the apex, the inferior ſurface the baſis, and the lateral regions the two ſides of the triangle.

In a diſtended bladder, the muſcular coat is thickeſt at the inferior ſurface and at the baſis; in other ſituations it is often remarkably thinner. This difference ariſes from the circumſtance, that the coats do not yield equally to diſtention in all directions; for, when we divide a contracted bladder, the thickneſs is nearly uniform throughout.

The deſcription of the muſcular fibres about the neck of the bladder is ſtated very differently by different writers. Some admit, and others deny the exiſtence of a ſphincter veſicæ, or circular muſcle ſurrounding the opening, and cloſing it by its contraction. The fibres in this ſituation are pale, and mixed with ſeveral veins and cellular texture; they are certainly completely continuous on all ſides with the reſt of the muſcular coat. It is obſerved by Haller, that a ſphincter was aſſigned to the bladder, in the firſt inſtance, from the ſuppoſed neceſſity of ſuch a ſtructure to account for the functions, rather than from actual diſſection; hence Veſalius places it in front of the proſtate. Santorini could find no circular fibres ſurrounding the mouth of the urethra. Others reject altogether the notion of a ſphincter; and Winſlow refers the deſcriptions of ſuch a part to faſciculi ariſing from the pubes. Haller gives the following deſcription from his own diſſections. In men there are tranſverſe and even arched fibres above, intricately connected together, and lying on the neck of the bladder, on the proſtate, and on the longitudinal fibres ariſing from the pubes. Others of an arched form, with the concavity towards the bladder, lie under theſe. In women he found fibres at the anterior part decuſſating at conſiderable angles, ſo as to form a kind of circle; in other inſtances they were more tranſverſe. The inferior fibres are tranſverſe, continuous with the circular ſtratum of the bladder, and covered by the proſtate. The effect of the contraction of theſe fibres, however ſlender and obſcure they may be, muſt be that of contracting the opening about which they are placed.

The modern French anatomiſts will not allow the fibrous ſubſtance about the neck of the bladder to be of a muſcular nature. "When the neck of the bladder," ſays Boyer, "is attentively diſſected, we find under the external cellular ſtratum, and between that and the mucous membrane, only a whitiſh, thick, firm, and fibrous ſubſtance, continuous with the muſcular coat, the fibres of which very manifeſtly end in it. There is no ſphincter, ſince we ſee no diſtinct muſcle, and the fibres of the neck are moreover continued with thoſe of the general muſcular coat. But the ſtructure, which we have juſt deſcribed, communicates to the neck of the bladder a reſiſting power, which, although not produced by the action of any particular muſcle, is ſtill ſuperior to the contractile tendency of the bladder." Traité complet. d'Anat. t. 4. p. 490.

The muſcular coat of the bladder is proportionally thicker in the fœtus and child, than in the adult. The irritability of the organ, and the force exerted in expelling its contents, ſeem to be greater in the early years of life.

The name of nervous coat has been given to a whitiſh ſtratum, placed between the muſcular and mucous coats. The ſtructure of this is completely cellular; it is looſer towards the former, and more cloſe towards the latter of the tunics. It is very extenſible, and recovers itſelf after diſtention, forming, in conjunction with the mucous membrane, the folds which we have deſcribed in the inner ſurface of the organ. It contributes conſiderably to the ſolidity of the ſides of the bladder.

The internal or mucous coat lines the whole interior. It is continuous on one ſide, with the linings of the ureters; and on the other, with that of the urethra. To its external ſurface adheres the cellular ſtratum juſt deſcribed. Internally it is perfectly ſmooth, having no viſible villi, nor any other inequalities except the rugæ which ariſe from contraction of the muſcular coat. Its ſurface is conſtantly covered by a mucous fluid, deſtined, in the opinion of phyſiologiſts, to protect it from the irritating qualities of the urine. This ſecretion muſt be perpetually removed by the urine and perpetually renewed. It is expelled in that fluid, and becomes ſenſible by chemical analyſis. When any cauſe of irritation affects the bladder, as for example, when a calculus is contained in it, this mucus is voided in very large quantities, to the amount of ſome ounces at each time of making water: in ſuch caſes it often ſubſides and concretes into a tolerably firm jelly.

The ſources of this ſecretion cannot be eaſily demonſtrated; although, as Haller obſerves, the glands of the bladder are mentioned as familiarly as if they were viſible on ſuperficial inſpection. Is the mucus poured out by the exhalants of the internal membrane, or ſecreted in a glandular apparatus? Sometimes, but rarely, ſays Haller, have I ſeen ſimple follicles on the external ſurface of the mucous coat, chiefly near the neck of the bladder; ſome round, like thoſe of the cheeks, equal in ſize to millet ſeeds, and in cluſters in the female, others ſmaller. At other times I ſaw no follicles, but mere pores." Element. Phyſiol. lib. 26. ſect. 2.

The mucous membrane is thin and whitiſh, particularly towards the neck of the bladder; in other parts it has a ſomewhat red tint. We do not know much of its organization or properties. It is continuous, through the urethra, with the epidermis, and ſeems to reſemble that part in being occaſionally detached in ſhreds, and renewed.

A whitiſh eminence is continued from the ureter on each ſide towards the mouth of the urethra, and ſometimes ſeems connected to the verumontanum. It is a firm ſubſtance, connected to the mucous membrane, and it forms the trigonum veſicæ already deſcribed. According to Haller and Morgagni, theſe riſings are not conſtant.

The arteries of the bladder are derived chiefly from the umbilical; ſome ſmall ones come from other branches of the internal iliac. The epigaſtric ſends twigs towards the fundus. They anaſtomoſe together, and form an elegant network between the muſcular and mucous coats, extending alſo into the latter. The veins, following the diviſions of the arteries, terminate on each ſide in the obturator and internal iliac veins. They ramify chiefly on the lateral and inferior regions of the organ, where they form, together with thoſe of the rectum, a conſiderable plexus.

The lymphatics ariſe from all points of the internal ſurface, and generally follow the blood-veſſels. They go through ſmall glands in the courſe of the umbilical arteries, and end in the hypogaſtric plexus.

The nerves come from the ſacral and from the great ſympathetic.

The urethra of the male has been deſcribed in the article GENERATION; we muſt inſert in this place an account of that canal in the female. It is about an inch or a little more in length, but much larger and more ſuſceptible of dilatation than in man. Its ſhortneſs and large diameter enable it to tranſmit ſtones of a conſiderable ſize; conſequently, the operation of lithotomy is much leſs frequently performed on females than on males; and the former ſuffer, on the whole, much leſs from calculous complaints. It has been enlarged by ſponge tents ſufficiently to admit the finger and thumb. Its direction is nearly horizontal from the neck of the bladder, at which it begins, under the pubes and clitoris to the pudenda; but it deſcribes a very ſlight curve, of which the concavity is turned upwards, and the convexity downwards. It correſponds above to the corpus cavernoſum of the clitoris, adhering to it by a looſe cellular ſubſtance.

Below it is very cloſely connected to the vagina, particularly in front, and forms a longitudinal projection, which is ſufficiently conſpicuous on the front of the canal. The anterior extremity is ſituated rather lower than the poſterior, and terminates by an opening, called the meatus urinarius, at the lower part of the triangular ſpace included between the nymphæ, and juſt on the front edge of the entrance into the vagina. This aperture, which is ſometimes as large as the urethra, which it terminates, ſometimes ſmaller, is irregularly rounded, and has a thick prominent margin, exhibiting the excretory ducts of certain mucous glands ſituated in the neighbourhood. In pregnancy, particularly towards the latter months, the meatus urinarius is rather drawn inwards, and not to be diſcovered without difficulty.

The ſtructure of the canal is analogous to that of the male urethra. Externally it is covered by a thick layer of cellular and vaſcular matter, the nature of which has not been clearly aſcertained, bearing conſiderable reſemblance on a ſection to the vaſcular texture round the male urethra. This is not confined by any proper covering, as in the male, but is connected by looſe cellular ſubſtance to the ſurrounding parts. At the front, the urethra and vagina are nearly conſolidated into one ſubſtance, and are covered by a common layer of convoluted veins, called the plexus retiformis. The internal ſurface of the urethra is lined by a thin mucous membrane, continuous at one end with that of the bladder, and at the other with the lining of the pudenda. It is marked by five or ſix longitudinal lines, in the intervals of which mucous lacunæ open in rows. There may be from four to ſeven orifices in each of the grooves, leading to canals, which are continued obliquely into the ſpongy texture of the urethra, and capable of receiving briſtles. On the tumid edge of the meatus urinarius two very large ſinuſes open, capable of admitting the end of a probe. The ſtructure of theſe organs reſembles entirely that of the lacunæ in the male urethra. The mucous fluid ſecreted by them defends the ſurface of the urethra from the irritation of the urine: it ſeems alſo to be poured out more particularly in coition, or under the influence of ſtrong deſires.

Beſides the difference of length and ſize in the urethra of the two ſexes, ariſing out of the additional function belonging to this canal in the male, of conveying the fecundating fluid into the vagina, the want of proſtate in the female is another remarkable diſtinction. There is no foundation whatever for the opinion of De Graaf concerning the female proſtate.

Functions of the Urinary Bladder.—The urine ſecreted, as we have already obſerved, inceſſantly by the kidnies, is tranſmitted, without interruption, through the ureters into the bladder, retained there for a certain length of time, and then expelled by an operation under the controul of the will. The bladder, in its empty ſtate, occupies a very ſmall ſpace, is concealed entirely within the pelvis, and has its relations to the ſurrounding organs reduced within a ſmall extent. Its contracted coats are thick, but all of them are not equally concerned in producing this ſtate of the organ. The ſerous coat, and the cellular layer, have nothing to do with it; and the mucous membrane, incapable of a quick and conſiderable contraction, forms the numerous wrinkles of the internal ſurface, which may be ſeen both in living animals, and in the dead ſubject. The continued contraction of the muſcular covering produces the ſtate in which the empty bladder is found; and if its coats at this time are thicker than thoſe of the ſtomach and inteſtines; it is becauſe the muſcular fibres are ſtronger and more abundant. At this time there is, properly ſpeaking, no cavity of the bladder. The urine, depoſited drop by drop, dilates the organ inſenſibly, and makes it contract new relations to the ſurrounding parts. Although this diſtention takes place in every direction, except towards the front, it is moſt ſenſible in the long diameter, or from below upwards. Its baſis preſſes on the rectum in man, and the vagina in woman; but the natural limits which the connections of theſe parts offer, prevent it from extending much downwards. In the oppoſite direction there is no obſtacle to prevent its enlargement: it riſes freely above the pubes, the muſcular coat is diſtended, the wrinkles of the mucous membrane are effaced, and the whole organ is conſequently rendered thinner.

The peculiar conformation of the ureters, at their entrance into the bladder, accounts for the urine not returning along theſe canals to the kidney. When the bladder is diſtended with urine or air, the ureters are compreſſed between the mucous and muſcular coats, in that portion which is included between theſe coverings: and the obſtacle becomes more complete, in proportion as the diſtention of the bladder is increaſed. This mechaniſm does not depend on any vital properties: you may throw air or any fluid into the dead bladder, through the urethra, but not a drop will gain admiſſion into the ureters; force the injection, and the bladder will burſt. Hence, when the urethra is impervious during life, and the bladder is diſtended far beyond its uſual dimenſions, the ureters are continually adding to the collection, ſtretching the organ ſo as to produce moſt ſevere pains, and ultimately cauſing rupture. If the muſcular covering be diſſected away, fluids eſcape immediately.

Thus, we have no difficulty in explaining why no urine paſſes in a retrograde courſe into the ureters: but the cauſe, which prevents it from entering the urethra, is not equally obvious. Although this be the natural courſe, the urinary fluid does not paſs conſtantly through the urethra, as it does through the ureters: it is retained for a conſiderable time, both in man and in quadrupeds, and never eſcapes ſpontaneouſly, in either inſtance, in the healthy ſtate. After a certain delay, a ſenſe of inconvenience and pain produces a voluntary muſcular exertion, by which it is expelled. As there is an uninterrupted flow of urine into the bladder, why does it not conſtantly eſcape? The voluntary act, by which we ſuddenly interrupt the ſtream in micturition, or reſiſt an urgent deſire to void the urine, is manifeſtly the contraction of the accelerator, which cloſes the bulb of the urethra, and conſequently intercepts the communication between the bladder and the front of the canal. But we inquire the cauſe which acts perpetually, not only independently of the will, but when we are not attending, even when we are aſleep, in preventing the urine from flowing guttatim through the urethra, as it arrives from the ureters. It is the more intereſting to diſcover this cauſe, ſince there ſeems to be in the bladder a natural tendency to contraction, in virtue of its irritable powers. Hence, where a direct opening is made into its cavity, when the reſiſting power of the neck is deſtroyed by paralyſis, or when an open catheter is left in the urethra, the urine eſcapes conſtantly as it is ſecreted, and no accumulation takes place in the bladder. The effect cannot be produced by a ſphincter, obedient to the action of the will, becauſe it takes place in an infant unconſcious of the uſages of ſociety and the laws of decorum, and in an animal which has never been trained to cleanlineſs. Both expel the urine at intervals, and in obedience to a ſtimulus, which ſeems to be the natural motive of the act. Moreover, the evacuation is ſo far from being ſpontaneous, that it requires a conſiderable effort.

Phyſiologiſts have commonly referred the cloſing of the urethra to the ſphincter veſicæ muſcle, and have conſidered it analogous, in every reſpect, to the ſphincter ani. But this is unſatisfactory, when the very exiſtence of the part, as a muſcle, is queſtioned. To the action of this, which he acknowledges to be inadequate to the effect, Haller joins the relative poſition of the bladder and urethra. He obſerves, that the inferior portion of the receptacle deſcends below the level of the urethra, and may conſequently be dilated without the urine running off through that opening; and that a greater portion of the bladder is ſo placed when the organ is diſtended. Hence, he adds, the bladder may be diſtended, in ſome degree, in the dead ſubject, before its contents will eſcape by the urethra. The French anatomiſts ſeem to be of opinion that there is ſome peculiar contractile and reſiſting power in the neck of the bladder: this is termed in the Anatomie Deſcriptive of Bichat, "le reſſort ou la reſiſtance organique du col:" t. v. p. 157. Boyer ſpeaks of the "habitual contraction of the fibres ſurrounding the neck of the bladder, and the elaſtic force of the neck and proſtate." Traité complet d'Anat. t. iv. p. 493.

We do not pretend to explain clearly the exact mode in which this buſineſs is effected. We ſee no ſphincter muſcle adequate to the purpoſe, and the circumſtance noticed by Haller will not at all account for the retention of the urine until the fundus of the bladder has aſcended far into the abdomen. We muſt be contented to recognize the exiſtence, without knowing the nature of a powerful contractile property in the neck of the bladder, retaining the urine, in ordinary circumſtances, until the ſenſe of inconvenience induces us to make the requiſite voluntary exertion for its evacuation, and, in paralyſis of the muſcular coat, and other ſtates of diſeaſe, holding it until the bladder, enormouſly diſtended, ſphacelates and burſts. The advantages of this arrangement, in enabling us to retain the urinary ſecretion, until it has accumulated in conſidereble quantity, and in ſecuring us from the fetor, excoriation, and other annoyances, which a conſtant involuntary flow of urine produces, are too obvious to need a more particular detail.

Does the retention of the urine in the bladder produce any alteration in its qualities? Phyſiologiſts generally believe that the water is partly abſorbed. The urine voided at different times poſſeſſes, as we have already remarked, very different properties: if, after emptying the bladder, we make water again in a ſhort time, it is almoſt colourleſs and inodorous; allow a long time to elapſe, and it will be high coloured, acrid, and have a ſtrong ſmell. The latter properties particularly characterize what is voided after a night's ſleep. Theſe circumſtances are moſt eaſily explained by the agency of the lymphatics. The admixture of ſecretions from the ſurface of the bladder is another important ſource of modifications in the urine, particularly when the organ is irritated or diſeaſed.

The increaſe in the quantity of urine accumulated in the bladder produces an unpleaſant feeling, which ſoon amounts to pain, and ends, if the cauſe continues, in the moſt excruciating agonies. Many circumſtances influence the length of time, during which the urine is retained, and the quantity that may be accumulated before the deſire to expel it is felt. The qualities of the fluid, as being more or leſs irritating, and the quantity ſecreted in a given time, produce conſiderable differences: a much larger quantity can be retained, when introduced gradually, than when ſecreted very faſt. Habit has conſiderable influence; and hence women, from the uſages of ſociety, can generally ſupport a greater diſtention than men. The bladder itſelf, without any diſeaſe, varies in its retentive power in the ſame individual, according to his ſtate of health: the effect of age is alſo very perceptible: the irritable bladder of the child empties itſelf very frequently; in advanced age the contrary is obſerved. But the effects of diſeaſe are more obvious and important; in paralyſis, diſtention produces no feeling, and the natural ſtimulus to evacuation does not take place. When the organ is affected by any irritating cauſe, as the preſence of a ſtone, it will hardly bear a few drops of fluid.

The evacuation of the bladder is the joint effect of two powers; *viz.* the action of the reſpiratory muſcles, and that of the muſcular coat of the organ. By the firſt we overcome the reſiſtance of the neck of the bladder; and the operation is finiſhed by the ſecond. We begin, as in all ſimilar efforts, by a deep inſpiration; then, retaining this air in the cheſt, we exert alſo the abdominal muſcles. The perpendicular poſition of the body ſubjects the bladder, in the moſt favourable way, to the downward preſſure of the diaphragm: the buſineſs is accompliſhed more difficultly in the recumbent poſture. The effort is always greater in proportion to the diſtention of the bladder: when the quantity of urine is ſmall, the exertion may be ſlight; but inſpiration in all caſes precedes micturition. A few drops, or a very ſlender ſtream, come through the urethra firſt, proving that the orifice of the bladder is very completely cloſed in the healthy ſtate. It then comes in a larger and larger current, and with increaſing force; being propelled further in young than in old ſubjects. When it flows in a full ſtream, we remit the effort with which the operation began, and continue reſpiration in the ordinary manner: the proceſs is completed by the powers of the bladder, which force out its contents in a continuous ſtream. We may ſtill increaſe the impetus by renewing the effort; or we may project a portion of the fluid more forcibly by the aſſiſtance of the accelerator urinæ muſcle. Perhaps the contraction of the bladder is the moſt important circumſtance in the operation; for, when that is paralyſed, we put the reſpiratory powers in action without effect. Diſtention of the organ very much weakens its expulſive power; ſo that, when we have retained the urine beyond the proper time, we exert the abdominal muſcles and diaphragm very violently for a conſiderable time without effect.

Towards the end of micturition, the urine again flows guttatim, as at the beginning; and the laſt portions are thrown into the urethra with ſo feeble an effort, that they muſt be expelled from that tube by the accelerator urinæ.

Kidneys, *Inflammation of.* See Nephritis.

Kidneys, *Calculus in.* See Nephralgia.

Kidneys *of Birds and Fiſhes.* See *Anatomy of* Birds, and Fish.

Kidney-*bean*, in *Gardening*, a common name which is often applied to a particular ſort of bean. See Phaseolus.

Kidney-*bean Tree*, the common name of a particular kind of tree. See Glycine.

Kidney-*vetch*, the common name of a peculiar ſort of vetch. See Anthyllis.

KIDONIA, or Cidonia, in *Geography*, a province of Crete, or Candia, which has retained the name of the ancient city of the Cretans, produces oil, grain, cotton, flax, ſilk, honey, wax, ſome fruits, and a tolerably large quantity of cheeſe: its territory is in general extremely fertile. The neareſt mountains which lie to the ſouth, being more temperate and more cool than the territory of Canea, yield a great many fruits; but little wine, much oil, and ſome wheat and barley are produced in this province. See Candia.

KIDWELLY, or Cidwelly, a market town and pariſh of Caermarthenſhire, South Wales, is ſeated on the banks of the river Gwandraeth, over which is a bridge, connecting two portions of the town called the new and old town. In the year 1800, the pariſh contained 333 houſes and 1388 inhabitants. Kidwelly has been for many ages a town of conſiderable traffic. "Its harbours were ſo well frequented as to render it the rival to Caermarthen; the fiſheries of this port were conſiderable; its coal trade great, and it had beſides a flouriſhing internal buſineſs in the clothing line. But the conditon of the place has been for years on the decline. By virtue of its charter, the affairs of the town are regulated by a mayor, who is choſen annually. About the middle of the ſixteenth century, Leland ſpeaks of Caermarthen having increaſed in conſequence of the decay of Kidwelly harbour, the entrance of which became ſuddenly intercepted by a dangerous ſand-bank, driven up by the ſea, that prevented veſſels of large burden from ſailing up the river as before. It is worthy of remark, that this bar of ſand, after lying ſo long in the ſituation above-mentioned, as to almoſt ruin the Kidwelly port, ſeparated, a few years back, of its own accord, in the middle, and now affords a ſufficient depth of water for the veſſels commonly employed in the trade of this part of the country to come up the river. The old town, in the time of Leland, was nearly deſolated, but the walls ſurrounding it appears, from his words, to have been entire, for he tells us, this part was "pretily waulid," and that he ſaw "three gates ther." The old town is at preſent inconſiderable." The caſtle, at one extremity of it, ſtands proudly elevated on an artificial mount, on the ſide of the marſhes. It is allowed to be the moſt perfect building of the kind in Wales, and, according to Mr. Donovan, "is certainly a magnificent remain of ancient military architecture. There is an air of ſolemn majeſty in its appearance, that beſpeaks a noble origin." In the ſame author's "Deſcriptive Excurſions," is a print of this caſtle, and a long note on the hiſtory of the building controverts the aſſertions of Camden, Buck, and Groſe, who affirm that "Kidwelly caſtle was built ſoon after the conqueſt by Maurice de Londres, one of the Norman knights, who conquered Glamorganſhire." Inſtead of this, Mr. Donovan ſays it was built in 1189, by Rhys, Prince of Wales. Since that time it has undergone various alterations and enlargements. The preſent remains are carefully preſerved from "every ſpecies of wanton depredation." The ground plan is nearly quadrangular, with four round towers at the angles; and ſmaller towers in the walls. At the weſt end is the chief entrance, between two other round towers. Several of the apartments are nearly perfect. The proſpects from the ſummit "are uncommonly fine."

Near the church, in the new town, was a priory, or cell of Black monks. Donovan's "Deſcriptive Excurſions through South Wales," 2 vols. 8vo. 1805.

KIE, or KIEH, a town of Perſia, in the province of Mekran; 100 miles N.N.E. of Kidge. N. lat. 27° 40′. E. long. 60° 8.

KIEKERNES, a town of Pruſſia, in the province of Jamland, ſituated on an iſland in the Ruſs; 19 miles N.W. of Tilſit.

KIEL, a town of Sweden, in the lapmark of Aſele; 55 miles S.S.E. of Aſele.

KIEL, a town of the duchy of Holſtein, ſituated at the bottom of a bay or gulf in the Baltic, and forming a convenient harbour. It contains 800 houſes, three churches, an univerſity founded in the year 1650 by Chriſtian Albert, duke of Holſtein-Gottorp, and conſiderably enlarged by the late king. It contains 24 profeſſors, and when Mr. Coxe viſited it about 300 ſtudents. It has alſo a college eſtabliſhed in 1768. The proſperity of this place very much depends upon an annual reſort to it of the nobility and perſons of wealth in Holſtein and Sleſwick, for the transfer and diſpoſal of their monies; this pecuniary intercourſe uſually laſted eight days, at which time was held a conſiderable fair, which commenced by the ringing of a bell on Twelfth-day, and terminated in the ſame manner on the eve of the Purification. It was formerly one of the Hanſe towns, and the ſtaple for all goods exported from or imported to Denmark. The diſtrict of Kiel is that portion of the duchy of Holſtein, which deſcended to the line of Holſtein-Gottorp, and belonged to Peter III. as part of his hereditary dominions. In 1773, the empreſs of Ruſſia ceded it to the king of Denmark, in exchange for the counties of Oldenburgh and Delmenhorſt, which ſhe gave to the prince biſhop of Lubec. This exchange was favourable to Denmark, as it poſſeſſed the whole duchy of Holſtein. For an account of the canal of Kiel, ſee CANAL.

KIEL, *Lake of*, a lake of Norway, in the province of Chriſtanſand; 16 miles N. of Chriſtanſand.

KIELEE, or KIALTZE, a town of Auſtrian Poland, in the palatinate of Sandomirz, the ſee of a biſhop; 24 miles E. of Malagoez.

KIELO, a town of Perſia, in the province of Irak; 35 miles N.E. of Sultania.

KIEMI. See KEMI.

KIEN, a town on the E. coaſt of the iſland of Ceram, one of the Molucca iſlands.

KIENG-HIEVER, a town of Perſia, in the province of Irak; 39 miles S.S.W. of Hamadan.

KIEN-NING, a city of China, of the firſt claſs, in the province of Fo-kien. To its diſtrict belong eight cities of the third claſs. It is ſituated on the river Minho, which renders it a place of conſiderable trade. At the time of the conqueſt of China by the Tartars, this city ſuſtained two ſieges, and refuſed to ſubmit to the power of the conqueror; but ſome time after it was taken, and all the inhabitants were put to the ſword. It was afterwards re-eſtabliſhed by the Tartars, who deſtroyed it. N. lat. 27° 5′. E. long. 117° 2′.

KIEN-TCHANG, a city of China, of the firſt claſs, in the province of Kiang-ſi, ſituated on the frontiers of the province of Fo-kien. It has five cities under its juriſdiction. In the adjacent country, which is fertile, the common rice is uſed in making wine, and a reddiſh ſort is uſed by the richer people for food. N. lat. 27° 35′. E. long. 118° 20′.

KIEOU-CARPOU, a town of Corea; 500 miles E.N.E. of Peking.

KIEOU-KIANG, a town of China, of the firſt claſs, in the province of Kiang-ſi, ſituated on the S. ſide of the river Yang-tſe-kiang, or Kian-ku; it has five cities under its juriſdiction. This city is the rendezvous of all the barks which paſs and repaſs from the other cities of this province, and the provinces of Kiang-nan and Hou-quang. Although it is 300 miles diſtant from the ſea, ſalmon, dolphins, and ſturgeon are taken in its river; which ebbs and flows every new and full moon. N. lat. 29° 53′. E. long. 115° 41′.

KIERADY, a town of Hindooſtan, in Benares; 15 miles E.S.E. of Chunar.

KIERALI, a town of Turkiſh Armenia, on the coaſt of the Black ſea, at the mouth of a river of the ſame name; 30 miles S.W. of Trebiſond.

KIERE, a town of Perſia, in the province of Irak; 20 miles S.E. of Caſbin.

KIERNOW, a town of Ruſſian Lithuania; 25 miles N.W. of Wilna.

KIERTEMINDE, a ſea-port town of Denmark, in the iſland of Funen, on the ſide of a large bay. The merchants of Odenſee have warehouſes in this town; eight miles E.N.E. of Odenſee. N. lat. 55° 22′. E. long. 10° 40′.

KIESELSCHIEFER, in *Mineralogy*, a ſpecies of ſtone, which, according to Werner, comprehends the two following ſubſpecies, *viz.* the *Siliceous ſchiſtus* of Kirwan, and the *baſanite* of the ſame author. The principal colour of the former is aſh-grey, blueiſh or greeniſh-grey, with occaſional ſpots or ſtripes of red, and is often croſſed by veins of quartz. It occurs in maſs, forming whole beds, or in ſmooth rounded pieces. Internally it is dull, rarely ſomewhat glimmering. Its fracture in the great is imperfectly ſlaty, and in the ſmall intermediate between ſplintery and uneven, inclining ſometimes to flat conchoidal. Its fragments are ſharp-edged, indeterminate. It is opaque, occaſionally ſomewhat tranſlucent on the edges. It is hard, but not difficult to break, and is moderately heavy. Before the blow-pipe it becomes white and friable. It is found among tranſition mountains, in thick beds, in Bohemia, Saxony, Switzerland, the ſouth of Scotland, and Siberia, &c. Wiedenmann ſuppoſes that this ſubſtance is argillite, containing a larger proportion than uſual of ſilex. It is one of the numerous rock maſſes called by the Germans Hornſchiefer. The ſecond ſubſpecies is the *baſanite* of Kirwan, the Lydian ſtone, or touch-ſtone. Its colour is greyiſh, paſſing into blueiſh-black. It occurs in maſs and in rounded fragments, generally penetrated by veins of quartz. Internally it is glimmering. Its fracture is even, approaching to conchoidal, and ſometimes to ſplintery: in maſs it is generally ſlaty. Its fragments are indeterminate and ſharp-edged, often trapezoidal. It is opaque, moderately hard, and eaſily frangible. Sp. grav. 2.4 to 2.8. It is found in ſimilar ſituations with the preceding. It is uſed, on account of its hardneſs and colour, as a touch-ſtone to aſcertain the comparative purity of the various kinds of gold and ſilver alloys. (See Touch stone.) Humboldt aſcribes its black colour to a portion of carbon See Schistus.

KIEV, Kief, *Kiof*, or *Kiow*, in *Geography*, a government of Ruſſia, bounded on the N. and N.E. by the government of Tchernigof, on the S.E. by the government of Ekaterinoſlav, on the S.W. and N.W. by Poland; about 148 miles long and 60 broad; ſituated for the moſt part on the left ſide of the Dnieper. Being part of the Ukraine, or Little Ruſſia, it was once a duchy belonging to the great dukes, and Kief was their principal reſidence. This country was conquered by the Tartars, and came again into the poſſeſſion of the great dukes; but was afterwards over-ran and poſſeſſed by the Coſſacks, under the protection of Poland. In 1654, the natives, diſcontented with John Caſimir, king of Poland, ſubmitted to Ruſſia, and have ever ſince continued ſubject to that empire. The vaſt privileges enjoyed by the natives have been gradually aboliſhed, and they are now reduced to the ſame ſtate as the other provinces of the Ruſſian empire. The country is a continued plain, very fertile, and producing abundance of grain and paſture, honey, flax, tobacco, &c. Its capital is Kiev or Kiof.

Kiev, *Kief*, or *Kiof*, the capital of the above government, and of the diſtrict belonging to it, is ſituated on the *Dnieper*, which ſee. It conſiſts of three ſmall towns, *viz.* the caſtle of Petſherſky, with its ſuburbs; the old city of Kiev; and the town of Podol, which lies below the latter. All theſe are partly incloſed by a common fortification, and communicate by a large entrenchment, carried on as the inequality of mountains would allow. The firſt mentioned caſtle ſtands on an eminence facing the ſouth; and, beſides barracks for the garriſon, magazines, officers' houſes, and ſome churches, includes a rich and ſtately monaſtery, founded in the eleventh century, and called "Petſherſky," becauſe the monks formerly lived in a "petſhera," like a cavern, on the mountain where the convent now ſtands. In its ſubterraneous vaults, which reſemble a labyrinth, and conſiſt of cells, chapels, &c. are found great numbers of undecayed bodies, ſuppoſed to be the remains of ſaints and martyrs. The old city of Kiev ſtands on an eminence facing the north, and is fortified, according to the mountainous nature of the country, with horn-works, &c. Here ſtands the cathedral. Podol lies below old Kiev, in the plain on the banks of the Dnieper, and beſides the univerſity, churches, and convents, entirely conſiſts of ſhops and tradeſmen's houſes. This city is the ſee of a Greek archbiſhop; 420 miles E. of Cracow. N. lat. 50° 32′. E. long. 30° 56′.

KIEUSK, a town of Natolia; 40 miles N.N.W. of Mogla.

KIEZVENSKOE, a town of Ruſſia, in the government of Perm; 80 miles N. of Perm.

KIFANTAN, a town of Bootan; 64 miles N. of Dinagepour.

KIFFER, an iſland in the Eaſt Indian ſea, about 20 miles in circumference, near the north coaſt of the iſland of Timor. S. lat. 8° 0′. E. long. 126° 20′.

KIFTELAK, a town of Hungary; 18 miles N.W. of Zegedin.

KIGELGA, one of the *Fox-iſlands*, which ſee. N. lat. 54°. E. long. 194° 28′.

KIGGELARIA, in *Botany*, was named by Linnæus in honour of Francis Kiggelar, a Dutchman, who imported many new and rare plants into Europe from America, and who publiſhed the *Hortus Beaumontianus* in 1690, and obſervations on *Commelin's Hortus Amſtelodamenſis* in 1697.—Linn. Gen. 528. Schreb. 697. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. v. 3. 409. Juſſ. 387. Lamarck. Dict. v. 3. 365. Illuſtr. t. 821. Gærtn. t. 44.—Claſs and order, *Dioecia Decandria*. Nat. Ord. *Columniferæ*, Linn. *Euphorbiæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of one leaf, concave, divided into five lanceolate, concave ſegments. *Cor.* Petals five, lanceolate, concave, a little longer than the calyx, and forming with it a ſort of cup; nectary of five ſmall, obtuſely three-lobed, depreſſed, coloured glands, the middle lobe larger; each gland attached to the claw of a petal. *Stam.* Filaments ten, very ſmall; anthers oblong, ſhorter than the calyx, opening at the tips by two perforations.—Female, *Cal.* and *Cor.* as in the male. *Piſt.* Germen ſuperior, roundiſh; ſtyles five, ſimple; ſtigmas obtuſe, ſlightly cloven. *Peric.* Capſule leathery, globoſe, rough, of one cell, and five valves. *Seeds* numerous, about eight, roundiſh, afterwards angulated, each covered with a tunic.

Eſſ. Ch. Male, Calyx five-cleft. Corolla of five petals; glands five, three-lobed. Anthers perforated at the tips. Female, Calyx and Corolla like the male. Styles five. Capſule of one cell, five valves, and many ſeeds.

1. *K. africana.* Linn. Sp. Pl. 1466. Hort. Cliff. 462. t. 29.—A native of the Cape of Good Hope It flowers in May and June, and was cultivated, ſo early as 1690, in the Royal Garden at Hampton Court. This *tree* generally riſes to the height of ſix or ſeven feet. *Stems* ſtrong and woody. The *bark* of the *branches* is at firſt ſmooth and green, but afterwards purpliſh. *Leaves* on footſtalks, alternate, lanceolate, ſerrated, ſpreading. On the male plant, *panicles of flowers* appear on branched ſtalks, with white petals and yellow nectaries; on the female, each flower ſtands on a ſimple ſtalk. *Capſule* rugged, and pubeſcent on the outſide, containing a reddiſh or ruſty-coloured pulp, in which the *ſeeds* are imbedded. The *fruit* has attained its full ſize in Chelſea Garden, but the *ſeeds* rarely come to maturity in this country.

Kiggelaria, in *Gardening*, compriſes a plant of the ever-green ſhrubby kind, which is the African kiggelaria, (K. Africana.)

Method of Culture.—Plants of this ſort may be increaſed by ſeeds, layers, and cuttings; but the ſeed method is the beſt, as they root but ſparingly in the other two modes.

The ſeeds ſhould be ſown in the early autumn, in pots filled with freſh loamy earth, being plunged in a hot-bed. After they have a few inches growth, they ſhould be removed into ſeparate ſmall pots, re-plunging them in the hot-bed; and when well rooted, they ought to be gradually hardened to the effects of the open air. The layers ſhould be made from the young ſhoots of the ſame year, putting them down in the ſummer months.

The cuttings of the young ſhoots ſhould be planted in the ſpring, immediately before the plants begin to ſhoot, in pots filled with ſoft loamy earth, being plunged in a very moderate hot-bed, and covered with glaſſes to exclude the air; due ſhade being afforded, and but little water given after the firſt planting. Such plants as ſtrike root may be removed into ſeparate ſmall pots of loamy earth, and be expoſed to the air, in a warm ſheltered ſituation, until the autumn, when they ſhould be placed under the protection of the green-houſe, and managed in the ſame mode as orange trees.

Theſe plants afford variety among other plants of the green-houſe kind, that are in pots.

KIGLEY, or Kighley, in *Geography*. See Keighley.

KIJASA, a mountain of Thibet; 25 miles S.E. of Giti.

KIKACCO, a town of Africa, in the kingdom of Congo; 30 miles S.E. of Pango.

KIKALA, a town of Sweden, in South Finland; 40 miles E.S.E. of Abo.

KIKIANY, one of the ſmall Japaneſe iſlands. N. lat. 29° 40′. E. long. 132° 25′.

KIKOV, a town of Japan, in the iſland of Niphon; 15 miles S.E. of Iwata.

KIKUKOVI, a town of Ruſſia, in the government of Tobolſk, on the Tchulim; 64 miles N.W. of Atchinſk.

KIKUTZ, a town of Japan, in the iſland of Ximo; 15 miles N.N.E. of Udo.

KIL, a town of Sweden, in the province of Warmeland; 12 miles S. of Chriſtinehamn.

KILAN, a province of the ſouth-eaſtern part of Great Bucharia, deriving its name, like the other provinces of this country, from its chief city.

KILANG. See Kelang.

KILANOI, a town of Sweden, in Weſt Bothnia; 105 miles N. of Tornea.

KILAR, a town of Perſia, in the province of Irak; 14 miles S.E. of Taheran.

KILBARCHAN, a ſmall town of Renfrewſhire, about 4 miles N.W. from Paiſley, and nearly the ſame diſtance from Renfrew. Kilbarchan is a thriving place, chiefly inhabited by the tradeſpeople employed in the various proceſſes of the extenſive cotton manufactures carried on through the whole of this diſtrict. There are alſo conſiderable manufactories of Scotch thread eſtabliſhed here.

KILBEGGAN, a poſt-town of the county of Weſtmeath, Ireland, which, before the union, had the privilege of ſending members to the houſe of commons. It is a ſmall town, on the river Broſna, and is remarkable for two old monaſteries. It is on the road from Dublin to Galway; 44 miles W. from Dublin, and 15 E. from Athlone.

KILBIRNIE, a village of Renfrewſhire, near Beith, where there is a fine loch or lake of water. It is a populous, thriving, little place, engaged, like moſt others in that part of the country, in the manufactures of cotton goods and thread.

KILBRIDE, East, is a ſmall village in Lanarkſhire, about 10 miles S.E. from Glaſgow. It is remarkable for ſome Roman antiquities, which have engaged the attention of antiquarians, who have publiſhed detailed accounts of various curioſities found and dug up in this neighbourhood. At preſent the great quantities of fine lime, which are worked in its neighbourhood, engage a conſiderably greater portion of attention, as it is found of great advantage to the whole ſurrounding diſtrict, both for the purpoſes of agriculture and building.

Kilbride, *Weſt*, is a ſmall village contiguous to the firth of Clyde, in Ayrſhire.

KILBURG, a town of France, in the department of the Sarre, and chief place of a canton, in the diſtrict of Prum. The place contains 561, and the canton 4307 inhabitants, in 26 communes.

KILCH, in *Ichthyology*, a name uſed by ſome for a ſpecies of fiſh of the albula kind, caught in the lakes of Germany, of a fine firm fleſh and delicate flavour, and ſeems very little, if at all, different from the ferra.

KILCOCK, in *Geography*, a poſt-town of the county of Kildare, province of Leinſter, Ireland, ſituated upon the river Blackwater. It is a ſmall town, 14 miles W. by N. from Dublin, on the road to Mullingar.

KILCONNELL, a ſmall poſt-town or village of the county of Galway, Ireland; 78 miles W. from Dublin, and almoſt 25 E. from Galway.

KILCULLEN, or Kilcullen-bridge, a poſt-town of the county of Kildare, province of Leinſter, Ireland, ſituated on the river Liffey, over which it has a bridge. It is on the great ſouthern road from Dublin, in conſequence of which its inns are much frequented. One mile and half ſouth of it is the village of Old Kilcullen, where is a church, and reſident clergyman. Here is a round tower, not exceeding 50 feet in height; and the ſhaft of a croſs, of a ſingle ſtone, 10 feet high. Kilcullen-bridge is 21 miles S.W. from Dublin. Carliſle.

KILDA, St., or Hirta, a remote iſland among the Hebrides, or weſtern iſlands of Scotland. It is ſeated in the Northern ocean, at the diſtance of about 60 miles from Harris, and 160 miles from the neareſt point of the main land of Scotland. This iſland is ſmall, being only three miles in diameter from eaſt to weſt, and two miles in a tranſverſe direction: the whole circumference is about ten miles. It is nearly ſurrounded with a perpendicular face of rock, which riſes to a conſiderable elevation; a ſmall bay or landing-place is found to the ſouth-eaſt. Mr. Macaulay, the hiſtorian of this iſland, ſays, it "may be ranked among the greateſt curioſities of the Britiſh empire. The ſituation of the place, the genius of the inhabitants, their manners and cuſtoms, the conſtitution of their little commonwealth, that amazing dexterity with which they manage the moſt important branches of their buſineſs, that unexampled courage with which they encounter dangers inſurmountable to any other race of men, and that perhaps happy ignorance which renders them abſolute ſtrangers to thoſe extravagant deſires and endleſs purſuits which keep the great and active world in a conſtant agitation;—all theſe, and ſome other extraordinary circumſtances, taken together at one view, ſeem highly to merit the attention of the inquiſitive." The ſurface of the iſland is moſtly rocky: in ſome places are patches of moſs, and in others graſs. The ſoil, though in many places well adapted to corn, is chiefly employed in paſture; as the inhabitants are rather averſe to agricultural purſuits. In the vicinity of the village a little corn is cultivated, and the paſture is richly manured. Barley and oats are only ſown: potatoes and cabbages, and ſome other garden plants, have recently been introduced into the iſland. Several ſprings iſſue from the hills, and form two ſmall ſtreams which run into the ſea on the eaſt and on the weſt. The village conſiſts of two rows of houſes, which are ſituated about a quarter of a mile from the bay, and contains all the inhabitants of Kilda. In the year 1764, when Macaulay publiſhed his Hiſtory, the iſland contained only 88 perſons; but he aſſerts that a contagious diſtemper (the ſmall-pox) "ſwept away the greateſt part of the people about four-and-thirty years ago." Martin found 180 perſons, when he viſited the iſland at the time here alluded to, *i. e.* 1690. The dwellings are all low, common huts, or cottages; divided into two rooms each, and peculiarly flat in the roof. One of the apartments is appropriated to the dwelling and ſleeping of the inhabitants, and the other for the cattle during winter. In theſe rooms they prepare the chief manure for the lands. Beſides theſe cottages, there are ſeveral cells or ſtorehouſes in different parts of the iſland. Theſe are compoſed wholly of ſtones, and are from 12 to 18 feet in length, by 7 feet in breadth and height. Fowl, eggs, and ſheep are the principal objects of care and ſolicitude to the Kildeans, who entirely ſupport themſelves, and pay their rents with theſe. The inhabitants manifeſt particular ſkill and courage in obtaining the firſt: for as their places of reſort for rearing their young, for rooſting, &c. are receſſes in the lofty cliffs on the coaſt, it requires particular adroitneſs and courage to reach ſuch ſpots. A fowling party conſiſts of four men, who are provided with a ſtrong rope made from thongs of raw cow-hide. One end of this is faſtened on the top of the cliff, whilſt two men deſcend by means of the rope to various cliffs in the rock, where they ſearch for eggs and young birds. Among theſe, the ſoland gooſe or gannet is deemed the moſt valuable prize.

The laird of Macleod is proprietor of this iſland, and its dependants, rocks, &c. He ſends his ſteward annually to collect the rents, which are paid in ſheep, butter, cheeſe, and wild-fowl. Around the iſland are ſeveral ſmall inſulated rocks, which are often covered with wild-fowl. Fluors, ſpars, and rock cryſtals are found on the north ſide of the iſland. This inſulated ſpot was certainly viſited by religious perſons at a remote period. Macaulay deſcribes a circular arrangement of upright ſtones, which he calls a Druidical temple; with other remnants of pagan worſhip and monaſtic rites. See his Hiſtory of St. Kilda, 8vo. 1764.

KILDARE, a county in the province of Leinſter, Ireland, bounded on the north by Meath, on the eaſt by Dublin and Wicklow, on the ſouth by Carlow, and on the weſt by the King's county and Queen's county. It extends from north to ſouth 32 Iriſh (40½ Engliſh) miles, and from eaſt to weſt 21 Iriſh (26½ Engliſh) miles, forming an area of 242,245 plantation acres, or 369 ſquare miles, equal to 389,198 Engliſh or ſtatute acres. Of theſe, there are 41,035 acres of bog. The number of pariſhes is ſtated by Dr. Beaufort to be 113; of which, 57 pariſhes belong to the ſee of Dublin, and 56 to that of Kildare. From unions there are, however, only 39 benefices, and 23 churches. The number of houſes ſtated in the return uſed by Dr. Beaufort is 11,205, from which the inhabitants are eſtimated at 56,000. This is a thin population for a county ſo near the capital, and not at all encumbered with mountains or high hills: but beſides the great proportion of bog it contains, upwards of 3000 acres are occupied by the *Curragh;* and although this beautiful plain affords paſture to an immenſe number of ſheep, there are but a very few habitations ſcattered around its edges. This county is moſtly flat, of fine arable ſoil, but much exhauſted, as, from its vicinity to Dublin, it has been for centuries the county from which the capital has principally drawn its ſupplies of grain. "In a county where one-fifth is bog," ſays Mr. Rawſon in his Survey, "much water muſt lie on the ſurface: this, of courſe, attracts the rain from every paſſing cloud. It may be remarked in the ſummer ſeaſon, that where a cloud paſſes over an extenſive bog or river, it is arreſted and drawn down. This cauſes the county to be ſubject to more moiſture than any in Ireland; and this evil muſt continue until the kingdom be relieved by a general drainage act, which ſhall compel ſlothful occupiers and proprietors to come forward, and contribute to ſuch extenſive drainings, on a great public ſcale, as the legiſlature may in its wiſdom direct, according to the benefit to be derived by each eſtate or property, through which ſuch drains ſhall be pointed out." Since the preceding remarks were written, an act of parliament has been paſſed, and ſums of money granted, for aſcertaining the nature and extent of the various large tracts of bog in Ireland; and the reports of the engineers employed contain much valuable information. For this ſtep, preparatory to a more effective meaſure, if the legiſlature ſhall be induced to proceed, the country is indebted, as for many other advantages, to the right honourable John Foſter, late chancellor of the Iriſh exchequer;—a gentleman who, though now often loaded with reproaches from a ſpirit of party, will in future times be numbered amongſt the greateſt benefactors of Ireland. The county of Kildare is full of ſprings and rivulets. The river Barrow forms its ſouth-weſt boundary, and receives the Grees. The Liffey takes a circular courſe through the north-eaſt of the county, and the river Boyne riſes in the bog of Allen. The Barrow is navigable from Athy, where it meets the Grand Canal, which, from Dublin, paſſes through this county, croſſing the Liffey on an aqueduct bridge, and ſoon after branches off. Near Claine is a collateral cut to the Shannon. The Royal Canal alſo has been carried through the northern part of the county, ſo that great advantage is derived to the inhabitants from the cheap conveyance of their products to market. The principal towns are Naas, the aſſize town, Athy, Monaſteraven, and Kildare; for account of which, ſee the articles under the reſpective names. As there is no borough of ſufficient extent to return a member to parliament, the county is repreſented by the two knights of the ſhire only; whilſt, before the union, it had ten members. Kildare was part of the territory acquired by earl Strongbow, in right of his wife, Eva, daughter of Dermot, king of Leinſter. From its neighbourhood to Dublin it was early colonized, and formed part of the Engliſh pale, when confined to four counties. There are in it the ruins of many caſtles and abbeys, ſome of which are mentioned in other parts of this work. It was alſo the ſcene of much diſtreſs during the rebellion of 1798; many battles having been fought in it, and a vaſt number of houſes deſtroyed, both by the rebels, and by the military force ſent to ſubdue them. Beaufort's Memoir. Rawſon's Statiſtical Account.

KILDARE, a poſt-town of the county of Kildare, Ireland. It is a ſmall and ruinous place, but it retains ſome veſtiges of having been of more importance in former times. There is a very fine round tower 130 feet high, and the ruins of two abbeys and of its cathedral. Except when there are races or encampments on the Curragh, which is very near it, it has no trade. It is 25 miles W.S.W. from Dublin.

KILDARE, a biſhopric in the province of Dublin, founded about the end of the 5th century. It comprehends part of three counties, *viz.* Kildare, King's county, Queen's county, and contains 332,200 plantation acres, which are divided into 81 pariſhes. The crown is patron of 27, the biſhop of 30, and different laymen of 24 pariſhes. In conſequence of unions, however, there are but 31 benefices, and 28 churches. The biſhop has no place of reſidence in his dioceſe, but being always dean of Chriſt-church, Dublin, reſides in or near that capital. Beaufort.

KILDERKIN, a kind of liquid meaſure, which contains two firkins, or eighteen gallons, beer-meaſure, and ſixteen ale-meaſure.

Two kilderkins make a barrel, and four an hogſhead.

KILDORRERY, in *Geography*, a ſmall poſt-town of the county of Cork, province of Munſter, Ireland; 107 miles S.W. from Dublin.

KILDUIN, a ſmall iſland in the North ſea. N. lat. 69°. E. long. 34° 14′.

KILDYSART, a ſmall poſt-town of the county of Clare, province of Munſter, Ireland, on the river Shannon; 122 miles S.W. from Dublin.

KILEF, a town of Great Bucharia, in the country of Balk, on the left ſide of the Gihon; 60 miles N.W. of Balk. N. lat. 37° 10′. E. long. 64° 30′.

KILFIT, a ſea-port town of Nubia, on the Red ſea, with a harbour, ſeven miles in circumference, ſafe from winds. N. lat. 21° 45′. E. long. 36° 40′.

KILGRUND, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 62° 5′. E. long. 21° 4′.

KILIA, or KILIA-NOVA, a town of European Turkey, in the province of Beſſarabia, at the mouth of the Danube, near the Black ſea; 20 miles E.N.E. of Iſmail. N. lat. 45° 28′. E. long. 30° 12′.

KILIOS, a town of Aſiatic Turkey, in Natolia, on the coaſt of the Black ſea; 20 miles W.S.W. of Amaſieh.

KILKARE, a town of Hindooſtan, in Marawar; 10 miles S.W. of Ramanadporum.

KILKEALE, a poſt-town of Ireland, in the county of Down, and province of Ulſter. It is ſituated on the Iriſh ſea, under the Mourne mountains, great part of which are in the pariſh of Kilkeale. It is 65 miles N. by E. from Dublin.

KILKENNY, the name of a county of Ireland, in the province of Leinſter. The ſurface of it extends from 52° 14′ to 52° 52′ N. lat. and from 6° 56′ to 7° 37′ W. long. from Greenwich. Its greateſt length from N. to S. from the Slewmagy hills to the Suire is 36 Iriſh (45½ Engliſh) miles; and its greateſt breadth from E. to W. is about 19 Iriſh (24 Engliſh) miles, but in the narroweſt part is not above 12 miles. The area, according to Dr. Beaufort, is 300,350 Iriſh, equal to 482,464 Engliſh acres; but Mr. Tighe, in his valuable ſtatiſtical ſurvey, from which this article is chiefly extracted, ſays, that by a ſurvey lately made for the uſe of the grand jury, they are ſtated at 318,249 Iriſh, which are equal to 510,882 Engliſh acres. The population, as calculated with great care from the hearth returns in 1800, is about 108,000 in 17,212 houſes. Dr. Beaufort, however, in 1792, ſtated the houſes as 17,569, though he did not make the inhabitants exceed 100,000; and he obſerves that the houſes are much fewer than what might be expected in a county which has been generally eſteemed one of the moſt populous in Ireland. The latter writer ſtates the number of pariſhes to be 127, of which 121, united in 45 benefices, are in the dioceſe of Offory, and the remaining ſix, forming four benefices, in that of Leighlin. The entire number of churches in the county is only 31, a very conſiderable proportion of the population being Roman Catholic. The poſition of a country ſtrongly affects the climate. This is agreeably experienced in this county. The declivity from the northern to the ſouthern boundary is about 500 feet, which conveys, with ſufficient rapidity, the water that falls upon the ſurface; and the river Nore flowing through the centre, deſcends about 13 feet during the run of a mile. Beſides this deſcent, which carries off the water, the ſurface of the county enjoys a favourable expoſure to the ſouth-eaſt. There is little either of bog or marſh to contain ſtagnant water, and the greater part of the ſubſtratum is limeſtone, brittle ſchiſtus, or porous argillite, and only in a ſmall part, a retentive clay. The vicinity of the ocean tends to render the climate mild, while the clouds, which are driven forward by the weſtern and ſouth-weſtern winds, are not arreſted here by high mountains, but paſſing over the low ſecondary hills and extended plains of this county, are attracted towards the lofty and primary ranges of rocks which riſe on the north-eaſt. From theſe circumſtances the crops are earlier in general than in the tillage countries to the northward. The quality of the ſoil is in general excellent. The northern part rather bears the appearance of poverty, but by judicious management, and the prudent application of lime and limeſtone gravel, it may be rendered conſiderably productive in corn and graſs. The ſouthern part is more favoured by nature; and where the hills ſubſide into plains or vallies, fertility ſmiles in all its native excellence. The Nore exhibits upon its banks the moſt delightful proſpects and the moſt luxuriant fields. It is not difficult to trace the nature of the different minerals in this county. Here is a termination of a chain of granite hills which take their riſe in Wicklow. The ſtone which uſually joins the granite, appearing to be impoſed on it, is ſiliceous ſchiſtus, and lower down occurs argillaceous ſlate; on the ſurface of the lower grounds are found large boulders of quartz, ſometimes pure white, ſometimes ſtreaked with red, and ſometimes encloſing yellow mica. In this granite diſtrict are alſo found a few beds of marle and limeſtone gravel near the foot of Brandon hill. Many of the lower hills conſiſt of ſiliceous breccia, which is compoſed of a ſilicious cement enveloping rounded pebbles of quartz, which have often a reddiſh tinge, and are from the ſize of a pea to two or three inches diameter. Such a breccia alſo forms many hills in the S. of Ireland, as the Galtees and other mountains in Cork and Limerick, and at leaſt part of Magillicuddy's rocks in Kerry. This breccia, when of a fine grain, is worked for millſtones. In the northern part of the county are excellent quarries for flags, eſpecially that of Shankill. The flags raiſed here are ſent to Dublin, Cork, and other places, where they chiefly go under the denomination of Carlow flags, being raiſed in the neighbourhood of that county, and moſtly ſent through the town of Carlow. The collieries of Caſtlecomer have been worked for about a century, and are yet unexhauſted. The coal found in them, and in other parts of the S. of Ireland, is un-inflammable, and is called Stone coal and Kilkenny coal, and when of inferior quality, *culm*. By Mr. Kirwan's analyſis it contains 97.3 *per cent.* of pure carbon. Mr. Tighe has given a very full account of the accompanying ſtrata, the manner of working, the expence, &c. The late lord Wandesford uſed to clear 6000*l.* or 7000*l.* a-year by theſe collieries, and ſometimes more. They now belong to lady Ormonde. The excellent qualities of the Kilkenny coal are well known in Ireland; on this account it is ſent to the north and the ſouth, to Londonderry, to Belfaſt, to Cork, and to Waterford, as well as to Dublin. No fuel dries malt ſo well, and this without any preparation; it is excellent for the forge, and for moſt works in iron; in every manufacture where ſteady heat is required devoid of ſmoke it cannot be excelled; nor does it dirty the flues where it is uſed. Manganeſe, iron ore, lead ore, and ſome indications of copper ore, are perceived in different parts. As long as timber laſted near Caſtlecomer, iron ore was ſmelted there; but it is now above ſeventy years ſince the forges have been uſed. In the limeſtone diſtrict of this county are many valuable marble quarries. The marble is black, though often with white marks, which appear more ſtrongly, or increaſe by long expoſure to the air. That which approaches neareſt to black is moſt valued. It contains a great variety of impreſſions, of madrepores, of bivalve, and of turbinate ſhells. By analyſis, a ſpecimen of the kind moſt uſual in chimney-pieces with marks of bivalve ſhells, contained 98 *per cent.* ſoluble in marine acid, and left 2 *per cent.* of a black powder, which appeared to be carbon, and burned without leaving any aſhes. On the whole, Kilkenny marble may be conſidered as containing 97 *per cent.* pure carbonate of lime, two *per cent.* carbon, and 1 *per cent.* magneſia and iron, of which the former is in the largeſt proportion. This marble is a valuable article of commerce. The quantity exported, notwithſtanding the diſadvantage of land carriage, is about 50 tons annually; if a canal were made it would conſiderably increaſe the demand, by lowering the price. There is a mill near Kilkenny, by which the marble is ſawed and poliſhed, which makes the price of chimney-pieces on the ſpot very reaſonable. There is a chalybeate ſpa at Ballyſpellin, near Johnſtown, the medical effects of which have been often celebrated, and which is much frequented. The rivers of this county excel both in utility and beauty. The following poetical account of them by the immortal Spenſer preſents an accurate, conciſe, and clear account of the origin, termination, and qualities of the three principal ones.

“ And there the three renowned brethren were,
Which that great giant Blomius begot
Of the fair nymph Rheüſa wand'ring there,
One day as ſhe to ſhun the ſeaſon hot,
Under Slewbloome in ſhady grove was got,
This giant found her, and by force deflowered;
Whereof conceiving ſhe in time forth brought
Theſe three fair ſons, which being thenceforth poured
In three great rivers ran, and many countries ſcoured.

The firſt the gentle Shure, that making way
By ſweet Clonmell, adorns rich Waterford;
The next the ſtubborn Newre, whoſe waters grey
By fair Kilkenny and Roſſe-ponte board;
The third, the goodly Barrow, which doth hoard
Great heaps of ſalmon in his deep boſom:
All which long ſundred, do at laſt accord
To join in one, ere to the ſea they come,
So flowing all from one, all one at laſt become.”

The Suir, which divides Kilkenny from Waterford, in a winding and majeſtic courſe of about 16 miles, conveys along the ſouthern border of this county, the trade that paſſes between Waterford, Carrick, and Clonmell. The Barrow ſkirts the eaſtern borders for about 20 miles, dividing it from Wexford and part of Carlow. This river is navigable to the town of Carlow, and thence communicates with the grand canal. The Newre, or Nore, more peculiarly belongs to this county, flowing nearly through its central part, in a winding courſe of not leſs than 36 miles from the neighbourhood of Durrow to its junction with the Barrow, paſſing by the city of Kilkenny. This laſt river receives many tributary ſtreams, and is navigable for ſmall veſſels to Iniſtioge. It is unneceſſary to enter into a minute detail of the obvious advantages of theſe rivers, both to the external appearance of the country and to the accommodation of the inhabitants. The natural and local advantages of this county tend to promote the intereſts of agriculture, which flouriſh in great perfection in different places, and the eaſy conveyance by water affords a ready market for all the productions of the ſoil. The roads in general are in good repair, and their ſituation judiciouſly choſen.

The county town is Kilkenny; beſides, Callan, Iniſtioge, Thomaſtown, Gowran, Knocktopher, Graigne Durrow, Caſtlecomer, and Freſhford, are entitled to the name of towns, though all of them are ſmall ones. There are five round towers in this county, namely, at St. Canice, Tulloherin, Kilree, Fartagh, and Aghaviller. The laſt is the moſt ruinous. Theſe are all ſituated cloſe to the churches, and whatever may have been their origin, appear admirably fitted for belfries. Gramig, or Grandiſon caſtle, is one of the moſt conſiderable remains of antiquity; it is ſituated on the banks of the river Suir. The whole county is full of caſtles, having been one of the firſt in which the Engliſh ſettled. It became part of the property of earl Strongbow, from whom it deſcended to the Mareſchals, earls of Pembroke. Iſabella, one of the daughters and coheireſſes of William, the laſt earl, conveyed it to Gilbert Clare, earl of Glouceſter and Hereford. The greater part of it afterwards came into poſſeſſion of the Butlers, earls and dukes of Ormond. The houſes of ſome of the abſentees bear evident marks of decay; theſe, however, are outweighed by the modern ſtructures, many of which are ornamented by the taſte of the proprietors. Tighe's Kilkenny; Beaufort's Memoirs; Robertſon's Traveller's Guide.

KILKENNY, a city of Ireland, in the county of the ſame name, and province of Leinſter, which, with the borough of St. Canice, forms one large town, ſurrounded by a diſtrict, called the county of the city of Kilkenny; it is delightfully ſituated on the river Nore, over which are two handſome bridges; it contains 2870 houſes, and a population of nearly 16,000. There are many large and good buildings, among which, the moſt remarkable are the biſhop's palace, the magnificent caſtle of the earl of Ormond, and the celebrated free ſchool or college, where many learned men, among whom Swift, Berkeley, and Congreve are conſpicuous, were educated. The inhabitants of Kilkenny have been long noted for the politeneſs of their manners. In this city and its environs abundance of blankets and much coarſe woollen cloth are manufactured. Kilkenny was formerly repreſented by four members, two for the city, and two for the borough of St. Canice. At preſent it has only one repreſentative. In former times parliaments were often held here, and the famous conſtitutions of Kilkenny, made when Lionel, duke of Clarence, was chief governor, in the reign of Edward III., long continued to be regarded as of the utmoſt importance to the welfare of the Engliſh colony. Kilkenny was alſo the ſeat of the Catholic council during the civil war, that ſucceeded the inſurrection of 1641. There are but two churches in the city, but there are ſeveral Roman Catholic chapels, each of which has congregations more numerous than both the churches. Kilkenny is 57½ miles S.W. from Dublin. N. lat. 52° 38′. W. long. 7° 15′. Beaufort. Tighe.

KILKENNY, a town of America, in Grafton county, New Hampſhire, incorporated in 1774, and containing 18 inhabitants.

KILKENNY *Coal.* See COAL, and KILKENNY, *ſupra.*

KILKENNY *Marble*, a fine black marble full of ſhells, and coralloid bodies, and much uſed in chimney-pieces, &c. See *Coralloid* MARBLE, and KILKENNY.

KILKERRAN BAY, in *Geography*, a harbour of Ireland, in the county of Galway, in that part of it called Connamara; in it there is good anchorage for veſſels of any burden, but the wild ſtate of the country prevents its being of much uſe. Its entrance is in N. lat. 53° 15′. W. long. 9° 50′. Beaufort. M'Kenzie.

KILKILA, a town of Perſian Armenia; 26 miles N.W. of Kanja.

KILL, an Iriſh word ſignifying a church or cemetery, which is uſed as a prefix to the names of many places in Ireland. There are two or three villages of this name, one on the great ſouthern road, about 12 miles from Dublin.

KILLACK, in *Geography*, a town of Perſia, in the province of Mekran, on the coaſt of the Arabian ſea; 60 miles W. of Tiz. N. lat. 25° 27′. E. long. 59° 20′.

KILLALI, a town of Abyſſinia; 100 miles S. of Mine.

KILLALLA, a ſea-port and poſt-town of the county of Mayo, province of Connaught, Ireland. It is ſituated on the weſtern coaſt of a bay of that name, opening into the Atlantic ocean, and is the ſee of a biſhop. There are ſome coarſe linen and woollen cloths made in it, but fiſhing is the chief occupation of the inhabitants. The French landed at this place on the 22d of Auguſt, 1798, and took poſſeſſion of it. A very intereſting narrative of their proceedings, till their departure, was publiſhed by Dr. Stock, at that time biſhop, who was a priſoner. Killalla is 127 miles N.W. from Dublin, and 24 nearly N. from Caſtlebar.

Killalla, a biſhopric in Ireland, founded in the fifth century, which is united with Achonry, and is in the eccleſiaſtical province of Tuam. The united ſees extend into the counties of Mayo and Sligo, the river May and the Ox mountains forming the boundary between them. They meaſure E. and W. 55 miles, and from N. to S. 21 miles. Large as this diſtrict is, there are only 20 benefices, each of which has a church, though only eight have glebe houſes. The cathedral is ſmall, but venerable for its antiquity; it is the only church in the pariſh, though a round tower at the other end of the town indicates the ancient ſcite of another church, of which no veſtige now remains. Beaufort.

KILLALOE, a biſhopric in Ireland, in the eccleſiaſtical province of Caſhel. It was founded early in the fifth century, and in 1752 was united with Killfenora, which, though ſmall in extent and value, had continued ſeparate till after the revolution, and was then annexed for ſeveral years to the ſees of Tuam and Clonfert ſucceſſively. The united ſees comprehend moſt of the county of Clare, and part of Tipperary, with ſmall portions of the King's and Queen's counties, Galway, and Limerick. The 138 pariſhes, united and condenſed into 50 benefices, have only 38 churches and four glebe houſes. The church of Killaloe is not large for a cathedral, but venerable for its antiquity, and in good preſervation, though built above 660 years. Beaufort.

Killaloe, a ſmall poſt-town of Ireland, in the county of Clare, and province of Munſter, Ireland. It is ſituated on the Shannon, over which it has a bridge of 19 arches. Below the bridge is a ledge of rocks which prevents the navigation of the river: here is a conſiderable ſalmon and eel fiſhery; but there is nothing beautiful in the town except the ſituation: very near the town, in the midſt of a fine demeſne, on the weſtern bank of the Shannon, the biſhop has a handſome reſidence, lately erected. Killaloe is 86½ miles S.W. by W. from Dublin, and 25 miles from Ennis.

KILLANORE, a town of Hindooſtan, in the Carnatic; 9 miles N.W. of Tritchinopoly.

KILLANY Bay, a bay on the E. coaſt of the iſland of Arranmore. N. lat. 53° 5'. W. long. 9° 36'.

KILLARD Point, a cape of Ireland, in the county of Down, at the S. of the entrance to Strangford Lough, and ſix miles E. from Downpatrick. N. lat. 54° 22'. W. long. 5° 27'.

KILLARNEY, a market and poſt-town of Ireland, in the county of Kerry, and province of Munſter. It is a neat and populous town, much frequented by ſtrangers on account of the adjoining lake, the pictureſque beauties of which charm every beholder. Lough Lane, or as it is more frequently called, the lake of Killarney, conſiſts of two lakes, joined by a long narrow channel; in the lower and larger lake, the pleaſing and the ſublime are moſt happily combined; the upper lake reflects a more ſolemn grandeur from the ſtupendous crags, with which it is encircled: but the proſpects in both are infinitely diverſified. The ſeveral iſlands, the white rocks of Mucruſs, the groves of arbutus, the venerable woods, the variety of waterfalls, and the impending cliffs, are ſeparately as delightful and intereſting as their aſſemblage is infinitely grand and magnificent. Mr. Weld has publiſhed an intereſting 4to. volume deſcriptive of the various objects that deſerve the notice of the traveller, but as theſe cannot well be abridged, we muſt paſs them over in this work. In the peninſula of Mucruſs, cobalt and other minerals have been found, but they are not worked. In Roſs iſland, in the lower lake, is a valuable mine, containing copper and lead; of the former there is not only rich ſulphuret, particularly the kind called *purple* ore, but alſo grey ore, which brings a high price. Killarney is the reſidence of the Roman Catholic biſhop of Kerry, and the population is chiefly of that religion. It is 144 miles S.W. from Dublin, and 38 W. from Cork. Beaufort.

KILLAS, in *Natural Hiſtory*, a name given by the people, who dig in the mines of Cornwall, to a kind of greyiſh-white earth, which is of great hardneſs, and ſeems to approach very much to the nature of the *ludus Helmontii* of ſome kinds, only that it is ſomewhat leſs hard than that, and has nothing of the ſepta or partitions that make the character of that foſſil. This earth contains ſo great a quantity of ſpar, that it ferments with acids very ſtrongly, though that ſpar being once diſſolved, and the earthy part of the ſubſtance only left, it will no longer ferment with theſe menſtruums; whence it is evident, that its terreſtrial matter is not alkaline, though the ſpar it contains is ſo.

This is the certain character of what is called killas in many parts of Cornwall, where it lies in ſtrata of two, three, or more feet thick, and often beſide this is laid on each ſide of the vein of tin or other ore. Its texture is either lamellar or coarſely granular; the lamellar is ſofter and leſs martial than the roof ſchiſtus: its ſpecific gravity from 2.63. to 2.666. Kirwan found 100 grains of the lamellar ſort to contain about 60 of ſilex, 25 of argil, 9 of magneſia, and 6 of iron; the greeniſh ſort contains more iron, and gives a greeniſh colour to the nitrous acid. In ſome other parts of England, the miners uſe the ſame word to expreſs a kind of white, brittle, and ſhattery ſtone, ſomewhat like the flag-ſtone with which they cover houſes in Northamptonſhire, and many other counties.

Killas is alſo uſed as the name of a ſlaty ſtone of various colours, ſpangled all over with talc in ſmall flakes in the place where they uſe it. In this ſenſe they generally expreſs themſelves, when talking of the earth deſcribed above, by the phraſe *white* killas. They alſo ſometimes call this flaky ſtone by the name *delvin*.

KILLEAM, in *Geography*, a parochial village in Stirlingſhire, ſituated on the water of Enrick, near its junction with Loch Lomond. Killeam is the birth-place of the celebrated hiſtorian and poet George Buchanan, whoſe hiſtory of Scotland, and Latin paraphraſe of the Pſalms of David, are ſo univerſally known. A handſome pillar near Killeam was lately erected as a monument to his memory. An extenſive printfield is the only manufacturing eſtabliſhment in this neighbourhood. The pure ſoft water of the Enrick is indeed extremely well fitted for all the operations of bleaching, dyeing, and printing, but the want of coal is an almoſt inſuperable objection in point of economy to ſuch works. The neareſt are nearly twelve miles diſtant. In the neighbourhood is Buchanan houſe, the family manſion of the duke of Montroſe.

KILLENAULE, a poſt-town of Ireland, in the county of Tipperary, and province of Munſter. The country around it is very fine. In the neighbourhood coal is found, of the ſame kind as that in the county of Kilkenny. It is 72½ miles S.W. from Dublin.

KILLERIES' Harbour, a bay of the Atlantic, on the weſt coaſt of Ireland, between the counties of Mayo and Galway. A vaſt number of herring buſſes rendezvous here in the fiſhing ſeaſon, from all parts of Galway and Mayo. N. lat. 53° 38′. W. long. 9° 46′.

KILLESANDRA, or Killeshandra, a poſt-town of Ireland, in the county of Cavan, and province of Ulſter. It is 61 miles N.W. from Dublin, and 8 miles S.W. from Cavan.

KILLFENORA, a village of the county of Clare, Ireland, which is the ſeat of a biſhopric, united to Killalloe. It is four miles N.N.E. from Enniſtymond, which is its poſt-town.

KILLICRANKY, a village of Perthſhire, in Scotland, near which is a famous road, cut in the ſide of a mountain, called "Killicranky Paſs:" on one ſide is a lofty mountain, and on the other a precipice of 100 yards; 12 miles N. of Dunkeld.

KILLIGRAY, a ſmall iſland of Scotland, between Lewis and North Uiſt. N. lat. 57° 43′. W. long. 7° 3′.

KILLINCHY, a poſt-town of Ireland, ſituated on Strangford Lough, in the county of Down. It is 92 miles N. by E. from Dublin.

KILLINESS Point, a cape of Scotland, on the coaſt of the county of Wigton, in Luce bay; 3 miles N. from the Mull of Galloway.

KILLING. See Homicide and Murder.

KILLINGIA, in *Botany*. See Kyllingia.

KILLINGLY, in *Geography*, a town of America, in Windham county, Connecticut, ſituated in the north-eaſtern part of the ſtate, bordering on Rhode iſland, and ſeparated from Pomfret by Quinebaug river; about 18 miles E. of Windham: incorporated in 1708, and containing 2279 inhabitants.

KILLINGTON, now Sherburne, a mountainous townſhip of America, in Rutland county, Vermont, having on the W. Medway, N.E. Barnard, S.E. Saltaſh, and containing 32 inhabitants. Killington peak is the higheſt land in Vermont, 3454 feet above the level of the ocean.

KILLINGTRINGAN Bay, a bay of Scotland, on the W. coaſt of the county of Wigton. N. lat. 54° 58′. W. long. 5° 12′.

KILLINGWORTH, a poſt-town of America, in Middleſex county, Connecticut, ſituated on Long iſland Sound; 9 miles E. of Guilford, from which it is ſeparated by a ſtream called Hammonaſſet, the Indian name of the townſhip. It was ſettled in 1663, incorporated in 1703, and contains 2049 inhabitants.

KILLISTINOES, Indians who originally inhabited a territory N. of Lake Superior, and could furniſh 250 warriors. They extend to the lake of the Hills, and N. to the Iſkimos. According to Mr. Mackenzie, they were originally the ſame people with the Algonkins, or inhabitants of the Atlantic coaſt. Their manners are deſcribed by Mackenzie. See our article Knisteneaux.

KILLMACDUAGH, a village of the county of Galway, which is an old epiſcopal ſee, united to Clonfert. It is 2½ miles from Gort, where is the pariſh church. Nothing but the walls of the cathedral remain, near which are the ruins of a monaſtery, and of ſeveral chapels. Theſe, with a large round tower, of very ancient and rude maſonry, denote the former conſequence of this wretched village. It is 12 miles N. from Ennis.

KILLMACTHOMAS, a fair and poſt-town of the county of Waterford, on the road from Cappoquin and Dungarvan to Waterford. It is 83 miles S.S.W. from Dublin.

KILLMALLOCK, a poſt-town of Ireland, which formerly ſent members to parliament. Two centuries ago, it was one of the beſt built inland towns in Ireland; the walls of many large houſes of ſtone, and excellent workmanſhip, remain to this day, whilſt the ruins of the churches and monaſteries, walls and gates, denote its former ſplendour, and have procured for it the name of the Balbec of Ireland. It is often mentioned in the military hiſtory of Ireland, and there is an extenſive diſtrict round it called the "Liberty of Killmallock." It is now, however, little more than a village; 4 miles from Charleville, 16 S. from Limerick, and 107½ S.W. from Dublin. Beaufort, &c.

KILLMICHAEL Point, a cape of Ireland, on the W. coaſt of the county of Wexford, in the Iriſh ſea. N. lat. 52° 44′. W. long. 6° 9′.

KILLMORE, a village which gives name to a biſhopric in Ireland, in the province of Armagh. The biſhopric was founded in the 13th century, and in the 15th, changed its ancient name of Brefny, into Killmore. There is no cathedral, but a ſmall pariſh church, 3½ miles from Cavan. It is ſituated in four counties, but chiefly in Cavan and Leitrim. There are 39 pariſhes in 30 benefices, and 36 churches.

KILLOS, a name given by the miners of Cornwall to a ſtone of the ſlate kind, found in the mines there. See Growan.

KILLOUGH, in *Geography*, a village of the county of Down, Ireland, on a bay to which it gives name, on the Iriſh ſea. Here is a remarkable well, called St. Scordin's well, which is highly eſteemed for the extraordinary brightneſs of its water. It is 7 miles S.E. from Clough.

KILLOW, or Cullow, an Engliſh name for a black earth of a very remarkable ſtructure, ſeeming of a mixed nature between the marbles, ochres, and clay; and uſually containing a large quantity of the matter of the common vitriolic pyrites or ink-ſtone, which gives it a very ſharp unpleaſant taſte, and makes it, when thrown on the fire, emit a ſlight blue flame of a ſulphureous ſmell, and calcine to a deep red. It is common in many parts of England, Wales, and Ireland. It is lighter than any of the other clays, though that is the genus to which it moſt properly belongs; and it is of an uneven ſurface, and ſhattery ſtructure.

KILLREA, in *Geography*, a poſt-town of Ireland, in the county of Londonderry; it is ſituated near the river Bann, and is 102 miles N. from Dublin.

KILLRUSH, a poſt-town of Ireland, in the county of Clare, and province of Munſter. It is ſituated upon the river Shannon, and is a place of ſome trade, ſome of the merchants of Limerick having agents reſiding here. It is 142 miles S.W. from Dublin.

KILLUCAN, a poſt-town of Ireland, in the county of Weſtmeath, and province of Leinſter; it is 28 miles W. by N. from Dublin.

KILLWORTH, a poſt-town of Ireland, in the county of Cork, Munſter, ſituated on the river Funcheon. It has gone very much to decay, on account of the neighbourhood of Fermoy; it is 108 miles S.W. from Dublin, and 18 N.E. from Cork.

KILLYBEGS, a poſt-town of Ireland, in the county of Donegal, which, before the Union, was repreſented in parliament. It is ſituated on a creek, on the N. ſide of Donegal bay, and has an extenſive herring-fiſhery; it is 124 miles N.W. from Dublin, and 13 miles W. from Donegal.

KILLY-HOLM, one of the ſmaller Orkney iſlands; about half a mile N. of Egliſha.

KILLYLEAGH, a poſt-town of Ireland, in the county of of Down, and province of Ulſter. It is ſituated on the W. coaſt of Strangford lough, and has a ſafe harbour for ſmall veſſels. Here ſir Hans Sloane, the famous naturaliſt, was born, in 1660; it is 80 miles N. by E. from Dublin, and 15 S.S.E. from Belfaſt.

KILLYTH-STALLION, in our *Old Writers*, is where lords of manors were bound by cuſtom to provide a ſtallion for the uſe of their tenants' mares.

KILMARNOCK, in *Geography*, a very induſtrious, thriving, manufacturing town in Ayrſhire, Scotland, 22 miles S.W. from Glaſgow. Its principal articles of ſtaple manufacture are coarſe woollens and carpets, and low priced gloves, beſides which a great number of weavers are employed in the cotton trade by the manufacturers of Glaſgow and Paiſley. Kilmarnock is ſituated in a very fertile part of the country, and is very plentifully ſupplied with coals from the extenſive coal-works of ſir William Cunningham of Caprington, which are in the immediate neighbourhood. Beſides ſir William Cunningham, the chief landed proprietors in this neighbourhood are, the ducheſs of Portland, and the counteſs of Loudon and Moira, both of whom here poſſeſs very large eſtates in their own right. The immenſe caſtle of Loudon, now building, will, when finiſhed, be one of the nobleſt family-ſeats in Britain. Kilmarnock, not being a royal borough, has no elective franchiſe for a member of parliament. In 1801, it contained 8079 inhabitants, of whom 6757 were employed in trade and manufactures. N. lat. 55° 40′. W. long. 4° 27′.

KILMES, a town of Ruſſia, in the government of Viatka; 28 miles N.E. of Malmiſch.—Alſo, a river of Ruſſia, which runs into the Viatka; 32 miles N.E. of Malmiſch.

END OF VOL. XIX.

Strahan and Preſton,
New-Street Square, London.

BINDING SECT. JUN 10 1981

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

AE Rees, Abraham
5 The cyclopaedia
R329
v.19

[redacted]

UTL AT DOWNSVIEW
D RANGE BAY SHLF POS ITEM C
39 14 06 09 04 041 4